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Requester's Full Name: Carol Chaney Examiner #: 72248 Date: 4-21-03
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Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: Lithium Based Phosphate Active MaterialsInventors (please provide full names): Jeremy Barker M. Yezid SaidiEarliest Priority Filing Date: 1-18-2000

For Sequence Searches Only Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.

Compounds of the formula



the compound has olivine structure

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Simferite

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Formula: $\text{Li}(\text{Mg,Fe,Mn})_2(\text{PO}_4)_2$

System: Orthorhombic

Colour: Red

New IMA-approved mineral

Classification of Simferite	
IMA status:	Approved
Strunz ID:	7/A.02-05 7 : Phosphates, Arsenates, Vanadates A : Waterfree phosphates [PO ₄] ³⁻ without unfamiliar anions, cations of small size: Li, Be, Al 02 : Simferrite - Natrophilite series
mindat.org URL:	http://www.mindat.org/min-3665.html Please feel free to link to this page.
Type Occurrence of Simferite	
Type Locality:	Radionovskoye pegmatite, Middle Berda River, Zaporozh'e District, Azov Sea Region, Ukraine
Year of Discovery:	1989
Physical Properties of Simferite	
Colour:	Red
Crystallography of Simferite	
Crystal System:	Orthorhombic
Cell Parameters:	a = 4.74, b = 10.1, c = 5.89
Ratio:	a:b:c = 0.469 : 1 : 0.583
Optical Data of Simferite	
Type:	Biaxial
RI values	$n_{\alpha} = 1.690 - 1.704$ $n_{\beta} = 1.702 - 1.716$ $n_{\gamma} = 1.712 - 1.726$ $n = 1.709$ (average)
Maximum Birefringence:	$\Delta = 0.022$
Surface Relief:	High
Relationship of Simferite to other Species	

Olivine Mineral Data Pronunciation Guide

Dakota Matrix Minerals www.dakotamatrix.com
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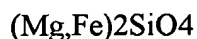
Extensive Inventory of very Rare Minerals

Visa and Mastercard are Welcome

General Information

Chemical

Formula:



Composition:

Molecular Weight = 153.31 gm

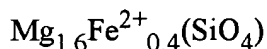
<u>Magnesium</u>	25.37 %	Mg	42.06 %	MgO
<u>Iron</u>	14.57 %	Fe	18.75 %	FeO
<u>Silicon</u>	18.32 %	Si	39.19 %	SiO ₂
<u>Oxygen</u>	41.74 %	O		

100.00 %

100.00 % = TOTAL OXIDE

Empirical

Formula:



Environment:

Basic and ultra basic igneous rocks.

IMA Status:

Not IMA Approved

Locality:

Common world wide occurrence. Link to MinDat.org Location Data.

Name Origin:

Named after the green color.

Synonym:

Chrysolite - light yellowish green
 Peridot

Search for Olivine Images

Images:

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Yet
Available

Image not yet available on Webmineral.com
 Try searching images.google.com for mineral pictures.
 Caution: The images retrieved may not be appropriate.

Crystallography

Axial Ratios:

a:b:c = 0.4663:1:0.6146

Cell Dimensions:

a = 4.78, b = 10.25, c = 6.3, Z = 4; V = 308.67 Den(Calc) = 3.30

Crystal System:

Orthorhombic - Dipyramidal H-M Symbol (2/m 2/m 2/m) Space
 Group: Pbnm

Physical Properties

Cleavage:

[001] Good, [010] Distinct

- **Density:** 3.27 - 3.37, Average = 3.32
- **Diaphaniety:** Transparent to translucent
- **Fracture:** Brittle - Conchoidal - Very brittle fracture producing small, conchoidal fragments.
- **Habit:** Massive - Granular - Common texture observed in granite and other igneous rock.
- **Hardness:** 6.5-7 - Pyrite-Quartz
- **Luminescence:** Non-fluorescent.
- **Luster:** Vitreous (Glassy)
- **Streak:** white

Optical Properties

- **Gladstone-Dale:** $CI_{meas} = 0.01$ (Superior) - where the $CI = (1 - KPD_{meas}/KC)$
 $CI_{calc} = 0.004$ (Superior) - where the $CI = (1 - KPD_{calc}/KC)$
 $KPD_{calc} = 0.2, KPD_{meas} = 0.1988, KC = 0.2009$
- **Optical Data:** Biaxial (+), $a = 1.63-1.65$, $b = 1.65-1.67$, $g = 1.67-1.69$, $bire = 0.0400$,
 $2V(Calc) = 88$, $2V(Meas) = 46-98$. Dispersion relatively weak.

Classification

- **Dana Class:** **51.3.1.0 (51)** Nesosilicate Insular SiO_4 Groups Only
(51.3) with all cations in octahedral [6] coordination
(51.3.1) Olivine group
 - 51.3.1.0 Olivine * $(Mg,Fe)_2SiO_4$ Pbnm 2/m 2/m 2/m
 - 51.3.1.1 Fayalite Fe_2SiO_4 Pbnm 2/m 2/m 2/m
 - 51.3.1.2 Forsterite Mg_2SiO_4 Pbnm 2/m 2/m 2/m
 - 51.3.1.3 Liebenbergite $(Ni,Mg)_2SiO_4$ Pbnm 2/m 2/m 2/m
 - 51.3.1.4 Tephroite Mn_2SiO_4 Pnma 2/m 2/m 2/m
 - 51.3.1.5 Laihunite $FeFe_2(SiO_4)_2$ P21/b 2/m
- **Strunz Class:** **VIII/A.04-00 VIII** - Silicates
VIII/A - Nesosilicates with $[SiO_4]4$ -groups, cations of octahedral orientation [6]
VIII/A.04 - Olivine group

Other Information

- **References:** NAME(Duda&Rejl90) PHYS. PROP.(Dana) OPTIC PROP.(Dana)
- **See Also:** **Links to other databases for Olivine :**
 - 1 - AZ Minerals 2 - Am. Min. Crystal Structure DB 3 - Am. Min. Crystal Structure DB 4 - Am. Min. Crystal Structure DB 5 - Am. Min. Crystal Structure DB 6 - Am. Min. Crystal Structure DB 7 - Am. Min. Crystal Structure DB 8 - Am. Min. Crystal Structure DB 9 - Am. Min. Crystal Structure DB 10 - Am. Min. Crystal Structure DB 11 - Am. Min. Crystal Structure DB 12 - Am. Min. Crystal Structure DB 13 - Am. Min. Crystal Structure DB 14 - Applied Mineralogy 15 - Athena 16 - Crocoite.com Mineral Locations 17 - Glendale Community College 18 - Google Images 19 - MinDAT 20 - MinMax(Deutsch) 21 - MinMax(English) 22 - Mineral and Gemstone Kingdom 23 - Minerals in Thin Section-University of North Carolina 24 - Minerals in Thin

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Olivine

[Show Locs \(188\)](#) [Olivine Gallery](#)
Formula: $(\text{Mg,Fe})_2\text{SiO}_4$
System: Orthorhombic **Colour:** Yellowish green, olive ...

Lustre: Vitreous **Hardness:** 6½ - 7

Name: Named after the green color.

Basic and ultra basic igneous rocks.

Puy de la Donise,
Puy-de-Dôme,
Auvergne, France

© 2001 John H. Betts

Classification of Olivine

Validity of Species:	Not a valid mineral species
Strunz ID:	8/AX.00-00 8 : Silicates AX : Unclassified nesosilicates 00 : Gadolinite Group
Hey's CIM Ref.:	14.21.1
mindat.org URL:	http://www.mindat.org/min-2983.html Please feel free to link to this page.

Physical Properties of Olivine

Lustre:	Vitreous
Colour:	Yellowish green, olive green, greenish black, or reddish brown
Streak:	White
Hardness (Mohs')	6½ - 7

Crystallography of Olivine

Crystal System:	Orthorhombic
------------------------	--------------

Optical Data of Olivine

Type:	Biaxial (+)
RI values	$n_{\alpha} = 1.630 - 1.650$ $n_{\beta} = 1.650 - 1.670$ $n_{\gamma} = 1.670 - 1.690$ $n = 1.660$ (average)
2V	Measured: 46° to 98°, Calculated: 88°
Maximum Birefringence:	$\Delta n = 0.040$

Maximum Strength:	Good, 6.5-7
Surface Relief:	Moderate
Chemical Properties of Olivine	
Formula:	(Mg,Fe) ₂ SiO ₄
Elements:	
Other Names for Olivine	
Synonyms:	Chrysopal Glinkite Hawaiite Chrysolite (in part)
Varieties:	Calcio-Olivine Olivinoid
Internet Links for Olivine	
Search Engines:	Look for Olivine on Google Look for Olivine images on Google
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Triphylite Mineral Data Pronunciation Guide


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General Information

Chemical

LiFe⁺⁺PO₄

Formula:

Composition:

Molecular Weight = 157.76 gm

<u>Lithium</u>	4.40 %	Li	9.47 %	Li ₂ O
<u>Iron</u>	35.40 %	Fe	45.54 %	FeO
<u>Phosphorus</u>	19.63 %	P	44.99 %	P ₂ O ₅
<u>Oxygen</u>	40.57 %	O		

100.00 % 100.00 % = TOTAL OXIDE

Empirical

Formula:

LiFe²⁺(PO₄)

Environment:

Secondary mineral commonly pseudomorphous of the original species.

Locality:

Branchville, Connecticut, USA. Link to MinDat.org Location Data.

Name Origin:

From the Greek tri - "threefold" and fylon - "family" in allusion to the three cations in the formula.

Search for Triphylite Images

Images:

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Yet
Available

Image not yet available on Webmineral.com
 Try searching images.google.com for mineral pictures.
 Caution: The images retrieved may not be appropriate.

Crystallography

Axial Ratios:

a:b:c=0.5819:1:0.454

Cell

Dimensions:

a = 6.0285, b = 10.3586, c = 4.7031, Z = 4; V = 293.69 Den(Calc)= 3.57

Crystal System:

Orthorhombic - Dipyramidal H-M Symbol (2/m 2/m 2/m) Space
 Group: Pbnm

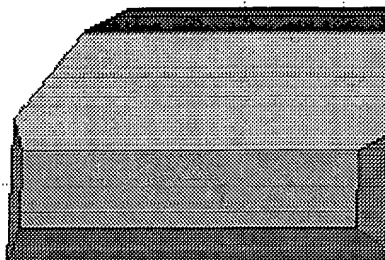
X Ray

Diffraction:

By Intensity(I/I₀): 2.54(1) 3.51(0.9) 4.29(0.9)

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Forms: [0 1 0] [1 2 0] [0 2 1] [0 1 1] [1 0 0]

Large Pop-Up

Warning: this large pop-up is very compute intensive and may not work well with some computers.

Physical Properties

- Cleavage:** [001] Perfect, [110] Good
- Density:** 3.4 - 3.6, Average = 3.5
- Diaphaniety:** Transparent to translucent
- Fracture:** Uneven - Flat surfaces (not cleavage) fractured in an uneven pattern.
- Habits:** Prismatic - Crystals Shaped like Slender Prisms (e.g. tourmaline)., Massive - Granular - Common texture observed in granite and other igneous rock.
- Hardness:** 4-5 - Fluorite-Apatite
- Luminescence:** None.
- Luster:** Greasy (Oily)
- Streak:** grayish white

Optical Properties

- Gladstone-Dale:** $CI_{meas} = -0.006$ (Superior) - where the $CI = (1 - KPD_{meas}/KC)$
 $CI_{calc} = 0.013$ (Superior) - where the $CI = (1 - KPD_{calc}/KC)$
 $KPD_{calc} = 0.1944, KPD_{meas} = 0.1983, KC = 0.197$
- Optical Data:** Biaxial (+/-), $a = 1.689 - 1.694$, $b = 1.689 - 1.695$, $g = 1.695 - 1.702$,
 $bire = 0.0060 - 0.0080$

Classification

- Dana Class:** **38.1.1.1 (38) Anhydrous Phosphates, etc**
(38.1) A+ B++ XO₄
(38.1.1) Dana Group
 - 38.1.1.1 Triphylite $LiFePO_4$ Pbnm 2/m 2/m 2/m
 - 38.1.1.2 Lithiophilite $LiMnPO_4$ Pmnb 2/m 2/m 2/m
 - 38.1.1.3 Natrophilite $NaMnPO_4$ Pnam 2/m 2/m 2/m
- Strunz Class:** **VII/A.02-10 VII - Phosphates, Arsenates and Vanadates**
VII/A - Waterfree phosphates [PO₄]³⁻ without unfamiliar anions. cations of medium size: Mostly Fe, Mn
VII/A.02 - Simferrite - Natrophilite series
 - VII/A.02-05 Simferrite $Li_{0.5}(Mg_{0.5}, Fe_{0.03}, Mn_{0.2})_2(PO_4)_3$ Pbnm, Pbn21 Ortho
 - VII/A.02-10 Triphylite $LiFePO_4$ Pbnm 2/m 2/m 2/m
 - VII/A.02-20 Lithiophilite $LiMnPO_4$ Pmnb 2/m 2/m 2/m
 - VII/A.02-30 Ferrisicklerite $Li(Fe, Mn)PO_4$ Pmnb 2/m 2/m 2/m
 - VII/A.02-40 Sicklerite $Li(Mn, Fe)PO_4$ Pmnb 2/m 2/m 2/m
 - VII/A.02-50 Heterosite $FePO_4$ Pmnb 2/m 2/m 2/m

VII/A.02-60 Purpurite MnPO_4 Pmnb 2/m 2/m 2/mVII/A.02-70 Maricite NaFePO_4 Pmnb 2/m 2/m 2/mVII/A.02-80 Natrophilite NaMnPO_4 Pnam 2/m 2/m 2/m

Other Information

- ☑ **References:** NAME(Duda&Rejl90) PHYS. PROP.(Enc. of Minerals,2nd ed.,1990)
OPTIC PROP.(Enc. of Minerals,2nd ed.,1990)
- ☑ **See Also:** **Links to other databases for Triphylite :**
1 - [AZ Minerals](#) 2 - [Athena](#) 3 - [EUROmin Project](#) 4 - [Google Images](#) 5
- [MinDAT](#) 6 - [MinMax\(Deutsch\)](#) 7 - [MinMax\(English\)](#) 8 - [Minerals of Wisconsin](#) 9 - [Scandinavian mineral gallery](#) 10 - [WWW-MINCRYST](#) 11
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Triphylite

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Formula: LiFePO_4
System: Orthorhombic

Hardness: 4 - 5

Classification of Triphylite

IMA status:	Approved
Strunz ID:	7/A.02-10 7 : Phosphates, Arsenates, Vanadates A : Waterfree phosphates $[\text{PO}_4]^{3-}$ without unfamiliar anions, cations of small size: Li, Be, Al 02 : Simferrite - Natrophilite series
Hey's CIM Ref.:	19.1.13
mindat.org URL:	http://www.mindat.org/min-4020.html Please feel free to link to this page.

Type Occurrence of Triphylite

Type Locality:	Hühnerkobel Pegmatite, Rabenstein, Zwiesel, Bavarian Forest, Bavaria, Germany
Year of Discovery:	1834

Physical Properties of Triphylite

Hardness (Mohs')	4 - 5
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Crystallography of Triphylite

Crystal System:	Orthorhombic
Cell Parameters:	a = 6.01, b = 11.34, c = 4.7
Ratio:	a:b:c = 0.53 : 1 : 0.414

Optical Data of Triphylite

Type:	Biaxial (+/-)
RI values	$n_{\alpha} = 1.689 - 1.694$ $n_{\beta} = 1.689 - 1.695$ $n_{\gamma} = 1.695 - 1.702$ $n = 1.692$ (average)
Maximum Birefringence:	$\Delta = 0.006 - 0.008$
Surface Relief:	High

Relationship of Triphylite to other Species

Series:	Forms a series with Lithiophilite (see here)
----------------	--

Related Minerals (Strunz Grouping):	7/A.02-05 Simferite	Li(Mg,Fe,Mn) ₂ (PO ₄) ₂
	7/A.02-20 Lithiophilite	LiMnPO ₄
	7/A.02-30 Ferrisicklerite	(Fe,LiMn)PO ₄
	7/A.02-40 Sicklerite	Li(Mn,Fe)PO ₄
	7/A.02-50 Heterosite	(Fe,Mn)PO ₄
	7/A.02-60 Purpurite	(Mn,Fe)PO ₄
	7/A.02-70 Mari?ite	NaFePO ₄
	7/A.02-80 Natrophilite	NaMnPO ₄
Chemical Properties of Triphyllite		
Formula:	LiFePO ₄	
Elements:		
Common Impurities:	Mn,Mg,Ca	
Other Names for Triphyllite		
Synonyms:	Lithio-Ferro-Triphyllite	
Internet Links for Triphyllite		
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Natrophilite Mineral Data Pronunciation Guide



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General Information

Chemical

NaMnPO₄

Formula:

Composition:

Molecular Weight = 172.90 gm

<u>Sodium</u>	13.30 %	Na	17.92 %	Na ₂ O
<u>Manganese</u>	31.77 %	Mn	41.03 %	MnO
<u>Phosphorus</u>	17.91 %	P	41.05 %	P ₂ O ₅
<u>Oxygen</u>	37.01 %	O		

100.00 % 100.00 % = TOTAL OXIDE

Empirical

Formula:

NaMn²⁺(PO₄)

Locality:

Link to [MinDat.org](#) Location Data.

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Yet
Available

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 Try searching images.google.com for mineral pictures.
 Caution: The images retrieved may not be appropriate.

Crystallography

■ **Axial Ratios:** a:b:c = 2.106:1:1.258

Cell

Dimensions:

a = 10.53, b = 5, c = 6.29, Z = 4; V = 331.17 Den(Calc) = 3.47

■ **Crystal System:** Orthorhombic - Dipyramidal H-M Symbol (2/m 2/m 2/m) Space Group: Pnam

X Ray

Diffraction:

By Intensity(I/I₀): 2.72(1) 2.6(0.8) 3.72(0.7)

Physical Properties

■ **Cleavage:** [100] Good, [010] Indistinct

■ **Density:** 3.41

■ **Diaphaniety:** Transparent to Translucent

- **Fracture:** Conchoidal - Fractures developed in brittle materials characterized by smoothly curving surfaces, (e.g. quartz).
- **Habit:** Massive - Uniformly indistinguishable crystals forming large masses.
- **Hardness:** 4.5-5 - Near Apatite
- **Luminescence:** Non-fluorescent.
- **Luster:** Resinous
- **Magnetism:** Nonmagnetic
- **Streak:** white

Optical Properties

- **Gladstone-Dale:** $CI_{meas} = -0.044$ (Good) - where the $CI = (1 - KPD_{meas}/KC)$
 $CI_{calc} = -0.026$ (Excellent) - where the $CI = (1 - KPD_{calc}/KC)$
 $KPD_{calc} = 0.1949, KPD_{meas} = 0.1983, KC = 0.19$
- **Optical Data:** Biaxial (+), $a=1.671$, $b=1.674$, $g=1.684$, $bire=0.0130$, $2V(Calc)=58$, $2V(Meas)=75$. Dispersion relatively strong.

Classification

- **Dana Class:** **38.1.1.3 (38) Anhydrous Phosphates, etc**
(38.1) A⁺ B⁺⁺ XO₄
(38.1.1) Dana Group
 - 38.1.1.1 Triphylite LiFePO₄ Pbnm 2/m 2/m 2/m
 - 38.1.1.2 Lithiophilite LiMnPO₄ Pmnb 2/m 2/m 2/m
 - 38.1.1.3 Natrophilite NaMnPO₄ Pnam 2/m 2/m 2/m
- **Strunz Class:** **VII/A.02-80 VII - Phosphates, Arsenates and Vanadates**
VII/A - Waterfree phosphates [PO₄]³⁻ without unfamiliar anions. cations of medium size: Mostly Fe, Mn
VII/A.02 - Simferrite - Natrophilite series
 - VII/A.02-05 Simferrite Li_{0.5}(Mg_{0.5},Fe_{0.03},Mn_{0.2})₂(PO₄)₃ Pbnm, Pbn21 Ortho
 - VII/A.02-10 Triphylite LiFePO₄ Pbnm 2/m 2/m 2/m
 - VII/A.02-20 Lithiophilite LiMnPO₄ Pmnb 2/m 2/m 2/m
 - VII/A.02-30 Ferrisicklerite Li(Fe,Mn)PO₄ Pmnb 2/m 2/m 2/m
 - VII/A.02-40 Sicklerite Li(Mn,Fe)PO₄ Pmnb 2/m 2/m 2/m
 - VII/A.02-50 Heterosite FePO₄ Pmnb 2/m 2/m 2/m
 - VII/A.02-60 Purpurite MnPO₄ Pmnb 2/m 2/m 2/m
 - VII/A.02-70 Maricite NaFePO₄ Pmnb 2/m 2/m 2/m
 - VII/A.02-80 Natrophilite NaMnPO₄ Pnam 2/m 2/m 2/m

Other Information

- **References:** PHYS. PROP.(Enc. of Minerals,2nd ed.,1990) OPTIC PROP.(Enc. of Minerals,2nd ed.,1990)
- **See Also:** **Links to other databases for Natrophilite :**
 - 1 - Am. Min. Crystal Structure DB 2 - Athena 3 - EUROmin Project 4 - Google Images 5 - MinDAT 6 - MinMax(Deutsch) 7 - MinMax(English) 8 - WWW-MINCRYST 9 - École des Mines de Paris

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[Rockhounds Discussion Group on Yahoo Groups](#)

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FILE 'HCAPLUS' ENTERED AT 13:20:53 ON 22 APR 2003

L1 8667 SEA BARKER ?/AU
L2 366 SEA SAIDI ?/AU
L3 42 SEA L1 AND L2
L4 1689 SEA BARKER J?/AU
L5 171 SEA SAIDI M?/AU OR SAIDI Y?/AU
L6 42 SEA L4 AND L5
L7 21717 SEA ?OLIVIN?
L8 3 SEA L6 AND L7
SEL L8 1-3 RN

FILE 'REGISTRY' ENTERED AT 13:22:18 ON 22 APR 2003

L9 68 SEA (257892-19-6/BI OR 349632-76-4/BI OR 349632-79-7/BI
L10 58 SEA L9 AND LI/ELS
L11 8 SEA L10 AND FE/ELS
L12 8 SEA L11 AND P/ELS
L13 8 SEA L12 AND O/ELS
L14 4 SEA L13 AND A2/PG

FILE 'HCAPLUS' ENTERED AT 13:26:53 ON 22 APR 2003

L15 7 SEA L14

FILE 'REGISTRY' ENTERED AT 13:27:14 ON 22 APR 2003

L16 12258 SEA O4P
L17 91455 SEA LI/ELS
L18 688135 SEA FE/ELS
L19 288576 SEA A2/PG
L20 47 SEA L16 AND L17 AND L18 AND L19
L21 17 SEA L20 AND 5/ELC.SUB

FILE 'HCAPLUS' ENTERED AT 13:30:22 ON 22 APR 2003

L22 18 SEA L21
L23 7 SEA L22 AND L7
L24 2 SEA L15 AND L7
L25 40 SEA L20
L26 QUE ELECTROD## OR ANOD## OR CATHOD##
L27 187327 SEA BATTERY OR BATTERIES OR (ELECTROCHEM? OR ELECTROLY?
OR GALVAN? OR WET OR DRY OR PRIMARY OR SECONDARY) (2A) (CEL
L OR CELLS)
L28 19 SEA L25 AND (L26 OR L27)
L29 9 SEA L25 AND L7

L30 14 SEA L15 OR L23 OR L24 OR L29
L31 9 SEA (L22 OR L28) NOT L30

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L30 ANSWER 1 OF 14 HCAPLUS COPYRIGHT 2003 ACS

2003:97868 Document No. 138:140078 Alkali/transition metal halo- and hydroxy-phosphates and related electrode active materials. Barker, Jeremy; Saidi, M. Yazid; Swoyer, Jeffrey L. (UK). U.S. Pat. Appl. Publ. US 2003027049 A1 20030206, 22 pp., Cont.-in-part of U.S. 6,387,568. (English). CODEN: USXXCO. APPLICATION: US 2001-14822 20011026. PRIORITY: US 2000-559861 20000427.

AB An electroactive material comprises: $AaMb(XY_4)cZ_d$, wherein (a) A is selected from the group consisting of Li, Na, and/or K, and $a = 0-8$; (b) M is .gtoreq.1 metal, comprising .gtoreq.1 metal which is capable of undergoing oxidn. to a higher valence state, and $b = 1-3$; (c) XY_4 is selected from the group consisting of $X'O_4-xY'x$, $X'O_4-yY'2y$, $X''S_4$, and mixts. thereof, where X' is P, As, Sb, Si, and/or Ge; X'' is P, As, Sb, Si, and/or Ge; Y' is halogen, $x = 0-3$; and $y = 0-4$; and $c = 0-3$; (d) Z is OH and/or halogen, $d = 0-6$; and wherein M, X, Y, Z, a, b, c, d, x, and y are selected so as to maintain the electroneutrality of the compd. Preferred embodiments include those having where $c=1$, those where $c=2$, and those where $c=3$. Preferred embodiments include those where $a \leq 1$ and $c=1$, those where $a=2$ and $c=1$, and those where $a \geq 3$ and $c=3$. This invention also provides electrodes comprising an electrode active material of this invention, and batteries that comprise a first electrode having an electrode active material of this invention; a second electrode having a compatible active material; and an electrolyte.

IT **484039-88-5P 484040-01-9P**, Iron lithium magnesium fluoride phosphate ($Fe_{0.9}Li_{1.25}Mg_{0.1}F_{0.25}(PO_4)$) (alkali/transition metal halo- and hydroxy-phosphates and related electrode active materials)

RN 484039-88-5 HCAPLUS

CN Iron lithium magnesium fluoride phosphate ($Fe_{0.9}Li_{1.25}Mg_{0.1}F_{0.25}(PO_4)$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
F	1	14762-94-8
O4P	1	14265-44-2
Mg	0.1	7439-95-4

Li	2	7439-93-2
Fe	0.9	7439-89-6

RN 484040-01-9 HCAPLUS

CN Iron lithium magnesium fluoride phosphate
(Fe_{0.9}Li_{1.25}Mg_{0.1}F_{0.25}(PO₄)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
F	0.25	14762-94-8
O4P	1	14265-44-2
Mg	0.1	7439-95-4
Li	1.25	7439-93-2
Fe	0.9	7439-89-6

IC ICM H01M004-58

ICS C01B017-98; C01B025-10; C01B033-08

NCL 429231950; 429231900; 429221000; 429223000; 429224000; 429220000;
429231500; 429222000; 423332000; 423341000CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 49

IT Chalcogenides

Olivine-group minerals

Oxides (inorganic), uses

(alkali/transition metal halo- and hydroxy-phosphates and related
electrode active materials)

IT 52934-02-8P, Cobalt lithium fluoride phosphate 52934-08-4P,
Lithium nickel fluoride phosphate 257892-19-6P, Sodium vanadium
fluoride phosphate (Na₃V₂F₃(PO₄)₂) 477779-87-6P, Sodium vanadium
fluoride phosphate NaVFPO₄ 477779-89-8P, Lithium sodium
vanadiumfluoride phosphate (Li_{0.95}Na_{0.05}VF(PO₄)) 484039-84-1P,
Cobalt lithium fluoride phosphate (CoLi₂F(PO₄)) 484039-86-3P, Iron
lithium fluoride phosphate (FeLi₂F(PO₄)) **484039-88-5P**
484039-91-0P, Lithium nickel fluoride phosphate (Li₂NiF(PO₄))
484039-93-2P, Iron lithium fluoride phosphate 484039-95-4P,
Lithium manganese fluoride phosphate (Li₂MnF(PO₄)) 484039-97-6P,
Copper lithium fluoride phosphate (CuLi₂F(PO₄)) **484040-01-9P**
, Iron lithium magnesium fluoride phosphate
(Fe_{0.9}Li_{1.25}Mg_{0.1}F_{0.25}(PO₄)) 484040-04-2P, Sodium vanadium
fluoride phosphate (Na_{1.2}VF_{1.2}(PO₄)) 484040-06-4P, Chromium sodium
fluoride phosphate 484040-08-6P, Manganese sodium fluoride
phosphate (MnNaF(PO₄)) 484040-10-0P, Cobalt sodium fluoride
phosphate (CoNaF(PO₄)) 484040-12-2P, Lithium sodium
vanadiumfluoride phosphate (Li_{0.1}Na_{0.9}VF(PO₄)) 484040-13-3P,
Sodium vanadium hydroxide phosphate NaVOHPO₄ 484040-14-4P, Iron
lithium fluoride phosphate (Fe₂Li₄F(PO₄)₃) 484040-15-5P, Lithium
vanadium fluoride phosphate (Li₄V₂F(PO₄)₃) 484040-20-2P, Lithium
manganese fluoride phosphate (Li₅Mn₂F₂(PO₄)₃) 484040-22-4P,
Lithium vanadium fluoride phosphate (Li₆V₂F(PO₄)₃) 484040-25-7P,
Chromium lithium sodium fluoride phosphate silicate
(CrLiNa_{0.2}F(PO₄)_{0.8}(SiO₄)_{0.2}) 484040-27-9P 484040-28-0P

493025-03-9P, Lithium manganese fluoride phosphate 493025-04-0P,
Copper lithium fluoride phosphate
(alkali/transition metal halo- and hydroxy-phosphates and related
electrode active materials)

L30 ANSWER 2 OF 14 HCAPLUS COPYRIGHT 2003 ACS

2003:42884 Document No. 138:92874 Alkali/transition metal halo- and hydroxy-phosphates and related electrode active materials. Barker, Jeremy; Saidi, M. Yazid; Swoyer, Jeffery L. (UK). U.S. Pat. Appl. Publ. US 2003013019 A1 20030116, 22 pp., Cont.-in-part of U. S. 6,387,568. (English). CODEN: USXXCO. APPLICATION: US 2001-45685 20011107. PRIORITY: US 2000-559861 20000427.

AB Electrode active materials comprise lithium or other alkali metals, a transition metal, a phosphate or similar moiety, and a halogen or hydroxyl moiety. Such electrode actives include those of the formula: $AaMb(XY_4)cZd$ wherein (a) A is selected from the group consisting of Li, Na, K, and mixts. thereof, and $0 < a \leq 6$; (b) M comprises one or more metals, comprising at least one metal which is capable of undergoing oxidn. to a higher valence state, and $1 \leq b \leq 3$; (c) XY_4 is selected from the group consisting of $X'O_4-xY'X_x$, $X'O_4-yY'_2y$, $X'S_4$, and mixts. thereof, where X' is P, As, Sb, Si, Ge, S, and mixts. thereof; X'' is P, As, Sb, Si, Ge and mixts. thereof; Y' is halogen; $0 \leq x < 3$; and $0 < y < 4$; and $0 < c \leq 3$; (d) Z is OH, halogen, or mixts. thereof, and $0 < d \leq 6$; and wherein M, X, Y, Z, a, b, c, d, x and y are selected so as to maintain electroneutrality of the compd. In a preferred embodiment, M comprises two or more transition metals from Groups 4 to 11 of the Periodic Table. In another preferred embodiment, M comprises $M'1-mM''m$, where M' is at least one transition metal from Groups 4 to 11 of the Periodic Table; M'' is at least one element from Groups 2, 3, 12, 13, or 14 of the Periodic Table, and $0 < m < 1$. Preferred embodiments include those having where $c=1$, those where $c=2$, and those where $c=3$. Preferred embodiments include those where $a \leq 1$ and $c=1$, those where $a=2$ and $c=1$, and those where $a \geq 3$ and $c=3$. This invention also provides electrodes comprising an electrode active material of this invention, and batteries that comprise a first electrode having an electrode active material of this invention; a second electrode having a compatible active material; and an electrolyte.

IT 484039-88-5

(alkali/transition metal halo- and hydroxy-phosphates and related electrode active materials)

RN 484039-88-5 HCAPLUS

CN Iron lithium magnesium fluoride phosphate ($Fe_{0.9}Li_2Mg_{0.1}F(PO_4)$)
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
F	1	14762-94-8
O4P	1	14265-44-2
Mg	0.1	7439-95-4

Li	2	7439-93-2
Fe	0.9	7439-89-6

IT 484040-01-9P

(alkali/transition metal halo- and hydroxy-phosphates and related electrode active materials)

RN 484040-01-9 HCAPLUS

CN Iron lithium magnesium fluoride phosphate
(Fe_{0.9}Li_{1.25}Mg_{0.1}F_{0.25}(PO₄)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
F	0.25	14762-94-8
O4P	1	14265-44-2
Mg	0.1	7439-95-4
Li	1.25	7439-93-2
Fe	0.9	7439-89-6

IC ICM H01M004-58

ICS C01B025-45; C01B025-30

NCL 429231900; 429231950; 429221000; 429223000; 429220000; 429224000;
429231500; 429231600; 423306000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT 7440-44-0, Carbon, uses 7782-42-5, Graphite, uses 484039-84-1,
Cobalt lithium fluoride phosphate (CoLi₂F(PO₄)) 484039-86-3, Iron
lithium fluoride phosphate (FeLi₂F(PO₄)) **484039-88-5**
(alkali/transition metal halo- and hydroxy-phosphates and related
electrode active materials)IT 52934-02-8P, Cobalt lithium fluoride phosphate 477779-87-6P,
Sodium vanadium fluoride phosphate NaVFPO₄ 484039-91-0P, Lithium
nickel fluoride phosphate (Li₂NiF(PO₄)) 484039-93-2P, Iron lithium
fluoride phosphate 484039-95-4P, Lithium manganese fluoride
phosphate (Li₂MnF(PO₄)) 484039-97-6P, Copper lithium fluoride
phosphate (CuLi₂F(PO₄)) **484040-01-9P** 484040-04-2P,
Sodium vanadium fluoride phosphate (Na_{1.2}VF_{1.2}(PO₄)) 484040-06-4P,
Chromium sodium fluoride phosphate 484040-08-6P, Manganese sodium
fluoride phosphate (MnNaF(PO₄)) 484040-10-0P, Cobalt sodium
fluoride phosphate (CoNaF(PO₄)) 484040-12-2P 484040-13-3P,
Sodium vanadium hydroxide phosphate (NaV(OH)(PO₄)) 484040-14-4P,
Iron lithium fluoride phosphate (Fe₂Li₄F(PO₄)₃) 484040-15-5P,
Lithium vanadium fluoride phosphate (Li₄V₂F(PO₄)₃) 484040-20-2P,
Lithium manganese fluoride phosphate (Li₅Mn₂F₂(PO₄)₃)
484040-22-4P, Lithium vanadium fluoride phosphate (Li₆V₂F(PO₄)₃)
484040-25-7P 484040-27-9P 484040-28-0P
(alkali/transition metal halo- and hydroxy-phosphates and related
electrode active materials)

L30 ANSWER 3 OF 14 HCAPLUS COPYRIGHT 2003 ACS

2002:928099 Document No. 138:6481 Process for producing
carbon-containing lithium-iron composite phosphorus oxide for
lithium secondary battery cathode active material. Kohzaki, Masao;

Takeuchi, Youji; Ukyo, Yoshio (Kabushiki Kaisha Toyota Chuo Kenkyusho, Japan). U.S. Pat. Appl. Publ. US 2002182497 A1 20021205, 11 pp. (English). CODEN: USXXCO. APPLICATION: US 2002-143946 20020514. PRIORITY: JP 2001-145396 20010515.

- AB A carbon-contg. lithium-iron composite phosphorus oxide for a lithium secondary battery pos. electrode active material, includes particles being composed of a lithium-iron composite phosphorus oxide having an **olivine** structure whose basic compn. is LiFePO_4 , and being composited with carbonaceous fine particles. A process for producing the same includes the steps of mixing a lithium compd. making a lithium source, an iron compd. making an iron source, a phosphorus-contg. ammonium salt making a phosphorus source and carbonaceous fine particles, thereby prepg. a mixt., and calcicing the mixt. at a temp. of from 600.degree. or more to 750.degree. or less.
- IT **476670-01-6P**, Iron lithium magnesium phosphate ($\text{Fe}_{0.8-0.98}\text{LiMg}_{0.02-0.2}(\text{PO}_4)$)
(carbon composited; process for producing carbon-contg. lithium-iron composite phosphorus oxide for lithium secondary battery cathode active material)
- RN 476670-01-6 HCAPLUS
- CN Iron lithium magnesium phosphate ($\text{Fe}_{0.8-0.98}\text{LiMg}_{0.02-0.2}(\text{PO}_4)$) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O4P	1	14265-44-2
Mg	0.02 - 0.2	7439-95-4
Li	1	7439-93-2
Fe	0.8 - 0.98	7439-89-6

- IC ICM H01M004-58
- NCL 429221000; 429232000; 252182100
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 49
- IT 15365-14-7P, Iron lithium phosphate FeLiPO_4 476669-99-5P, Iron lithium manganese phosphate ($\text{Fe}_{0.8-0.98}\text{LiMn}_{0.02-0.2}(\text{PO}_4)$)
476670-01-6P, Iron lithium magnesium phosphate ($\text{Fe}_{0.8-0.98}\text{LiMg}_{0.02-0.2}(\text{PO}_4)$) 476670-03-8P, Iron lithium nickel phosphate ($\text{Fe}_{0.8-0.98}\text{LiNi}_{0.02-0.2}(\text{PO}_4)$) 476670-05-0P, Cobalt iron lithium phosphate ($\text{Co}_{0.02-0.2}\text{Fe}_{0.8-0.98}\text{Li}(\text{PO}_4)$) 476670-07-2P, Copper iron lithium phosphate ($\text{Cu}_{0.02-0.2}\text{Fe}_{0.8-0.98}\text{Li}(\text{PO}_4)$)
476670-10-7P, Iron lithium zinc phosphate ($\text{Fe}_{0.8-0.98}\text{LiZn}_{0.02-0.2}(\text{PO}_4)$) 476670-12-9P, Germanium iron lithium phosphate ($\text{Ge}_{0.02-0.2}\text{Fe}_{0.8-0.98}\text{Li}(\text{PO}_4)$)
(carbon composited; process for producing carbon-contg. lithium-iron composite phosphorus oxide for lithium secondary battery cathode active material)

olivines as lithium storage electrodes. Chung, Sung-Yoon; Bloking, Jason T.; Chiang, Yet-Ming (Department of Materials Science and Engineering, Massachusetts Institute of Technology, Cambridge, MA, 02139, USA). Nature Materials, 1(2), 123-128 (English) 2002. CODEN: NMAACR. ISSN: 1476-1122. Publisher: Nature Publishing Group.

AB Lithium transition metal phosphates are of interest as storage cathodes for rechargeable Li batteries because of their high energy d., low raw materials cost, environmental friendliness and safety. Their key limitation was extremely low electronic cond., believed to be intrinsic to this family of compds. Controlled cation nonstoichiometry combined with solid-soln. doping by metals supervalent to Li⁺ increases the electronic cond. of LiFePO₄ by a factor of .apprx.108. The resulting materials show near-theor. energy d. at low charge/discharge rates, and retain significant capacity with little polarization at rates as high as 6,000 mA/g. In a conventional cell design, they may allow development of Li batteries with the highest power d. yet.

IT **478819-84-0**, Iron lithium magnesium phosphate (FeLi_{0.99}Mg_{0.01}(PO₄)) **478819-92-0**, Iron lithium magnesium phosphate (Fe_{0.99}LiMg_{0.01}(PO₄)) (electronically conductive phospho-**olivines** as lithium storage cathodes for batteries)

RN 478819-84-0 HCAPLUS

CN Iron lithium magnesium phosphate (FeLi_{0.99}Mg_{0.01}(PO₄)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O4P	1	14265-44-2
Mg	0.01	7439-95-4
Li	0.99	7439-93-2
Fe	1	7439-89-6

RN 478819-92-0 HCAPLUS

CN Iron lithium magnesium phosphate (Fe_{0.99}LiMg_{0.01}(PO₄)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O4P	1	14265-44-2
Mg	0.01	7439-95-4
Li	1	7439-93-2
Fe	0.99	7439-89-6

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST lithium battery storage cathode cond doped phospho **olivine**
; iron lithium phosphate doped aluminum magnesium niobium titanium
zirconium

IT Battery cathodes

(electronically conductive phospho-olivines as lithium storage cathodes for batteries)

IT 15365-14-7, Iron lithium phosphate (FeLiPO_4)
(doped; electronically conductive phospho-olivines as lithium storage cathodes for batteries)

IT 478819-81-7, Iron lithium zirconium phosphate ($\text{FeLi}_{0.99}\text{Zr}_{0.01}(\text{PO}_4)$)
478819-82-8, Iron lithium titanium phosphate ($\text{FeLi}_{0.99}\text{Ti}_{0.01}(\text{PO}_4)$)
478819-83-9, Iron lithium niobium phosphate ($\text{FeLi}_{0.99}\text{Nb}_{0.01}(\text{PO}_4)$)
478819-84-0, Iron lithium magnesium phosphate ($\text{FeLi}_{0.99}\text{Mg}_{0.01}(\text{PO}_4)$) 478819-85-1, Aluminum iron lithium phosphate ($\text{Al}_{0.01}\text{FeLi}_{0.99}(\text{PO}_4)$) 478819-86-2, Iron lithium niobium phosphate ($\text{Fe}_{0.99}\text{LiNb}_{0.01}(\text{PO}_4)$) 478819-87-3, Iron lithium titanium phosphate ($\text{Fe}_{0.99}\text{LiTi}_{0.01}(\text{PO}_4)$) 478819-89-5, Iron lithium zirconium phosphate ($\text{Fe}_{0.99}\text{LiZr}_{0.01}(\text{PO}_4)$) 478819-90-8, Aluminum iron lithium phosphate ($\text{Al}_{0.01}\text{Fe}_{0.99}\text{Li}(\text{PO}_4)$) **478819-92-0**, Iron lithium magnesium phosphate ($\text{Fe}_{0.99}\text{LiMg}_{0.01}(\text{PO}_4)$)
(electronically conductive phospho-olivines as lithium storage cathodes for batteries)

L30 ANSWER 5 OF 14 HCAPLUS COPYRIGHT 2003 ACS

2002:428819 Document No. 137:8642 Methods of making lithium metal compounds useful as cathode active materials in batteries. Barker, Jeremy; Yazid, Saidi M.; Swoyer, Jeffrey L. (Valence Technology, Inc., USA). PCT Int. Appl. WO 2002044084 A2 20020606, 85 pp.
DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2001-US43633 20011119. PRIORITY: US 2000-724085 20001128.

AB The invention provides a novel method for making lithium mixed metal materials for battery cathodes. The lithium mixed metal materials comprise lithium and at least one other metal besides lithium. The invention involves the reaction of a metal compd., a phosphate compd., with a reducing agent to reduce the metal and form a metal phosphate. The invention also includes methods of making lithium metal oxides involving reaction of a lithium compd. and a metal oxide with a reducing agent.

IT **349632-76-4P**, Iron lithium magnesium phosphate ($\text{Fe}_{0.9}\text{LiMg}_{0.1}(\text{PO}_4)$)
(methods of making lithium metal compds. useful as cathode active materials in batteries)

RN 349632-76-4 HCAPLUS

CN Iron lithium magnesium phosphate ($\text{Fe}_{0.9}\text{LiMg}_{0.1}(\text{PO}_4)$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
-----------	-------	------------------------------

O4P	1	14265-44-2
Mg	0.1	7439-95-4
Li	1	7439-93-2
Fe	0.9	7439-89-6

IC ICM C01B025-00

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 49

IT 7664-38-2DP, Phosphoric acid, lithiated transition metal compds.
12162-92-4P, Lithium vanadium oxide LiV_2O_5 15365-14-7P, Iron
lithium phosphate FeLiPO_4 84159-18-2P, Lithium vanadium phosphate
 $\text{Li}_3\text{V}_2(\text{PO}_4)_3$ **349632-76-4P**, Iron lithium magnesium phosphate
($\text{Fe}_{0.9}\text{LiMg}_{0.1}(\text{PO}_4)$) 372075-82-6P, Lithium manganese fluoride
phosphate LiMnFPO_4 372075-83-7P, Lithium vanadium fluoride
phosphate ($\text{LiVF}(\text{PO}_4)$) 372075-84-8P, Chromium lithium fluoride
phosphate CrLiFPO_4 372075-85-9P, Lithium titanium fluoride
phosphate LiTiFPO_4 372075-86-0P 372075-87-1P, Iron lithium
fluoride phosphate FeLiFPO_4 433708-98-6P, Copper lithium fluoride
phosphate ($\text{CuLiF}(\text{PO}_4)$) 433708-99-7P, Cobalt lithium fluoride
phosphate ($\text{CoLiF}(\text{PO}_4)$) 433709-00-3P, Lithium nickel fluoride
phosphate ($\text{LiNiF}(\text{PO}_4)$) 433709-01-4P, Iron lithium magnesium
phosphate ($\text{Fe}_{0.67}\text{LiMg}_{0.33}(\text{PO}_4)$)
(methods of making lithium metal compds. useful as cathode active
materials in batteries)

L30 ANSWER 6 OF 14 HCAPLUS COPYRIGHT 2003 ACS

2002:272915 Document No. 136:297401 Nonaqueous electrolyte battery
with high discharge capacity. Sakai, Hidecki; Fukushima, Yuzuru;
Kuyama, Junji; Hosoya, Mamoru (Sony Corporation, Japan). Eur. Pat.
Appl. EP 1195838 A2 20020410, 17 pp. DESIGNATED STATES: R: AT, BE,
CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT,
LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 2001-123895
20011005. PRIORITY: JP 2000-308303 20001006.

AB A nonaq. electrolyte cell is disclosed having high discharge
capacity, an improved capacity upkeep ratio and optimum cyclic
characteristics. The nonaq. electrolyte cell has a cell device
including a strip-shaped cathode material and a strip-shaped anode
material, layered and together via a separator and coiled a plural
no. of times, a nonaq. electrolyte soln., and a cell can for
accommodating cell device and the nonaq. electrolyte soln. The
cathode employs a cathode active material contg. a compd. of the
olivinic structure represented by the general formula
 $\text{Li}_x\text{Fe}_{1-y}\text{M}_y\text{PO}_4$, where M is at least one selected from the group
consisting of Mn, Cr, Co, Cu, Ni, V, Mo, Ti, Zn, Al, Ga, **(Mg)**, B and
Nb, with 0.05 $\leq x \leq 1.2$ and 0 $\leq y \leq 0.8$,
with the compd. being used either singly or in combination with
other materials. The ratio of an inner diam. d to an outer diam. D
of cell device is selected so that $0.05 < d/D < 0.5$.

IT **407606-49-9**, Iron lithium magnesium phosphate
($\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}\text{Mg}_{0-0.8}(\text{PO}_4)$)
(nonaq. electrolyte battery with high discharge capacity)

RN 407606-49-9 HCAPLUS
 CN Iron lithium magnesium phosphate ($\text{Fe}_{0.2}\text{-Li}_{0.05}\text{-1.2Mg}_{0.8}(\text{PO}_4)$)
 (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Mg	0 - 0.8	7439-95-4
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

IC ICM H01M010-40
 ICS H01M004-58

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT 7439-93-2, Lithium, uses 15365-14-7, Iron lithium phosphate
 felipo4 407606-22-8, Chromium iron lithium phosphate
 ($\text{Cr}_{0.8}\text{Fe}_{0.2}\text{-Li}_{0.05}\text{-1.2}(\text{PO}_4)$) 407606-24-0, Cobalt iron lithium
 phosphate ($\text{Co}_{0.8}\text{Fe}_{0.2}\text{-Li}_{0.05}\text{-1.2}(\text{PO}_4)$) 407606-26-2, Copper iron
 lithium phosphate ($\text{Cu}_{0.8}\text{Fe}_{0.2}\text{-Li}_{0.05}\text{-1.2}(\text{PO}_4)$) 407606-28-4,
 Aluminum iron lithium phosphate ($\text{Al}_{0.8}\text{Fe}_{0.2}\text{-Li}_{0.05}\text{-1.2}(\text{PO}_4)$)
 407606-30-8, Gallium iron lithium phosphate ($\text{Ga}_{0.8}\text{Fe}_{0.2}\text{-Li}_{0.05}\text{-1.2}(\text{PO}_4)$)
 407606-32-0, Boron iron lithium phosphate
 ($\text{B}_{0.8}\text{Fe}_{0.2}\text{-Li}_{0.05}\text{-1.2}(\text{PO}_4)$) 407606-34-2, Iron lithium manganese
 phosphate ($\text{Fe}_{0.2}\text{-Li}_{0.05}\text{-1.2Mn}_{0.8}(\text{PO}_4)$) 407606-36-4, Iron
 lithium nickel phosphate ($\text{Fe}_{0.2}\text{-Li}_{0.05}\text{-1.2Ni}_{0.8}(\text{PO}_4)$)
 407606-39-7, Iron lithium vanadium phosphate ($\text{Fe}_{0.2}\text{-Li}_{0.05}\text{-1.2V}_{0.8}(\text{PO}_4)$)
 407606-42-2, Iron lithium molybdenum phosphate
 ($\text{Fe}_{0.2}\text{-Li}_{0.05}\text{-1.2Mo}_{0.8}(\text{PO}_4)$) 407606-44-4, Iron lithium titanium
 phosphate ($\text{Fe}_{0.2}\text{-Li}_{0.05}\text{-1.2Ti}_{0.8}(\text{PO}_4)$) 407606-47-7, Iron
 lithium zinc phosphate ($\text{Fe}_{0.2}\text{-Li}_{0.05}\text{-1.2Zn}_{0.8}(\text{PO}_4)$)
407606-49-9, Iron lithium magnesium phosphate
 ($\text{Fe}_{0.2}\text{-Li}_{0.05}\text{-1.2Mg}_{0.8}(\text{PO}_4)$) 407606-51-3, Iron lithium niobium
 phosphate ($\text{Fe}_{0.2}\text{-Li}_{0.05}\text{-1.2Nb}_{0.8}(\text{PO}_4)$) 407629-83-8
 407629-87-2 407629-90-7 407629-95-2 407630-01-7 407630-05-1
 407630-10-8 407630-14-2 407630-25-5, Aluminum iron lithium
 phosphate ($\text{Al}_{0.7}\text{Fe}_{0.3}\text{Li}(\text{PO}_4)$) 407630-29-9, Gallium iron lithium
 phosphate ($\text{Ga}_{0.7}\text{Fe}_{0.3}\text{Li}(\text{PO}_4)$) 407630-35-7 407630-40-4, Boron
 iron lithium phosphate ($\text{B}_{0.75}\text{Fe}_{0.25}\text{Li}(\text{PO}_4)$) 408501-54-2
 (nonaq. electrolyte battery with high discharge capacity)

L30 ANSWER 7 OF 14 HCAPLUS COPYRIGHT 2003 ACS

2002:272914 Document No. 136:297400 Nonaqueous electrolyte secondary
 battery using **olivinic** lithium phosphorus oxide cathode
 active material. Okawa, Tsuyoshi; Hosoya, Mamoru; Kuyama, Junji;
 Fukushima, Yuzuru (Sony Corporation, Japan). Eur. Pat. Appl. EP
1195837 A2 20020410, 15 pp. DESIGNATED STATES: R: AT, BE, CH, DE,
 DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI,
 RO. (English). CODEN: EPXXDW. APPLICATION: EP 2001-123893
 20011005. PRIORITY: JP 2000-308302 20001006.

AB In a battery, liq. leakage or destruction may be prevented as the
 apparent energy d. per unit vol. of the cell is maintained. The

cell uses, as a cathode active material, a compd. of an **olivinic** crystal structure having the formula $\text{Li}_x\text{Fe}_{1-x}\text{MyPO}_4$, where M is at least one selected from the group of Mn, Cr, Co, Cu, Ni, V, Mo, Ti, Zn, Al, Ga, Mg, B and Nb and $0.05 \leq x \leq 1.2$ and $0 \leq y \leq 0.8$. By adjusting the amt. of the electrolyte soln., the amt. of the void in the container is set so as to be not less than 0.14 mL and not more than 3.3 mL per 1 Ah of the cell capacity.

IT **407606-49-9**, Iron lithium magnesium phosphate
($\text{Fe}_{0.2}\text{-1Li}_{0.05}\text{-1.2Mg}_{0.8}(\text{PO}_4)$)
(nonaq. electrolyte secondary battery using **olivinic**
lithium phosphorus oxide cathode active material)
RN **407606-49-9** HCAPLUS
CN Iron lithium magnesium phosphate ($\text{Fe}_{0.2}\text{-1Li}_{0.05}\text{-1.2Mg}_{0.8}(\text{PO}_4)$)
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Mg	0 - 0.8	7439-95-4
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

IC ICM H01M010-40
ICS H01M004-58
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST battery **olivinic** lithium phosphorus oxide cathode; nonaq
electrolyte lithium secondary battery
IT Secondary batteries
(lithium; nonaq. electrolyte secondary battery using
olivinic lithium phosphorus oxide cathode active
material)
IT Battery cathodes
Composites
(nonaq. electrolyte secondary battery using **olivinic**
lithium phosphorus oxide cathode active material)
IT Coke
(pitch; nonaq. electrolyte secondary battery using
olivinic lithium phosphorus oxide cathode active
material)
IT 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate
7440-44-0, Carbon, uses 15365-14-7, Iron lithium phosphate FePO_4
21324-40-3, Lithium hexafluorophosphate 407606-22-8, Chromium iron
lithium phosphate ($\text{Cr}_{0.8}\text{Fe}_{0.2}\text{-1Li}_{0.05}\text{-1.2}(\text{PO}_4)$) 407606-24-0,
Cobalt iron lithium phosphate ($\text{Co}_{0.8}\text{Fe}_{0.2}\text{-1Li}_{0.05}\text{-1.2}(\text{PO}_4)$)
407606-26-2, Copper iron lithium phosphate ($\text{Cu}_{0.8}\text{Fe}_{0.2}\text{-1Li}_{0.05}\text{-1.2}(\text{PO}_4)$)
407606-28-4, Aluminum iron lithium phosphate
($\text{Al}_{0.8}\text{Fe}_{0.2}\text{-1Li}_{0.05}\text{-1.2}(\text{PO}_4)$) 407606-30-8, Gallium iron lithium
phosphate ($\text{Ga}_{0.8}\text{Fe}_{0.2}\text{-1Li}_{0.05}\text{-1.2}(\text{PO}_4)$) 407606-32-0, Boron iron
lithium phosphate ($\text{B}_{0.8}\text{Fe}_{0.2}\text{-1Li}_{0.05}\text{-1.2}(\text{PO}_4)$) 407606-34-2, Iron
lithium manganese phosphate ($\text{Fe}_{0.2}\text{-1Li}_{0.05}\text{-1.2Mn}_{0.8}(\text{PO}_4)$)

407606-36-4, Iron lithium nickel phosphate ($\text{Fe}_{0.2}\text{Li}_{0.05}\text{Ni}_{1.2}\text{O}_{0.8}(\text{PO}_4)$) 407606-39-7, Iron lithium vanadium phosphate ($\text{Fe}_{0.2}\text{Li}_{0.05}\text{V}_{0.8}(\text{PO}_4)$) 407606-42-2, Iron lithium molybdenum phosphate ($\text{Fe}_{0.2}\text{Li}_{0.05}\text{Mo}_{0.8}(\text{PO}_4)$) 407606-44-4, Iron lithium titanium phosphate ($\text{Fe}_{0.2}\text{Li}_{0.05}\text{Ti}_{0.8}(\text{PO}_4)$) 407606-47-7, Iron lithium zinc phosphate ($\text{Fe}_{0.2}\text{Li}_{0.05}\text{Zn}_{0.8}(\text{PO}_4)$) **407606-49-9**, Iron lithium magnesium phosphate ($\text{Fe}_{0.2}\text{Li}_{0.05}\text{Mg}_{0.8}(\text{PO}_4)$) 407606-51-3, Iron lithium niobium phosphate ($\text{Fe}_{0.2}\text{Li}_{0.05}\text{Nb}_{0.8}(\text{PO}_4)$) 407629-83-8 407629-87-2 407629-90-7 407629-95-2 407630-01-7 407630-05-1 407630-10-8 407630-14-2 407630-19-7 407630-25-5, Aluminum iron lithium phosphate ($\text{Al}_{0.7}\text{Fe}_{0.3}\text{Li}(\text{PO}_4)$) 407630-29-9, Gallium iron lithium phosphate ($\text{Ga}_{0.7}\text{Fe}_{0.3}\text{Li}(\text{PO}_4)$) 407630-35-7 407630-40-4, Boron iron lithium phosphate ($\text{B}_{0.75}\text{Fe}_{0.25}\text{Li}(\text{PO}_4)$) 407630-46-0 (nonaq. electrolyte secondary battery using **olivinic** lithium phosphorus oxide cathode active material)

L30 ANSWER 8 OF 14 HCAPLUS COPYRIGHT 2003 ACS

2002:272913 Document No. 136:297399 Nonaqueous electrolyte secondary battery with a compound of an **olivinic** structure as a cathode active material. Okawa, Tsuyoshi; Hosoya, Mamoru; Kuyama, Junji; Fukushima, Yuzuru (Sony Corporation, Japan). Eur. Pat. Appl. EP 1195836 A2 20020410, 15 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 2001-123892 20011005. PRIORITY: JP 2000-308301 20001006.

AB A non-aq. electrolyte secondary cell contg. a compd. of an **olivinic** structure as a cathode active material is to be improved in load characteristics and cell capacity. To this end, there is provided a non-aq. electrolyte secondary cell including a cathode having a layer of a cathode active material contg. a compd. represented by the general formula $\text{Li}_x\text{Fe}_y\text{M}_y\text{PO}_4$, where M is at least one selected from the group consisting of Mn, Cr, Co, Cu, Ni, V, Mo, Ti, Zn, Al, Ga, Mg, B and Nb, with $0.05 \leq x \leq 1.2$ and $0 \leq y \leq 0.8$, an anode having a layer of an anode active material and a non-aq. electrolyte, wherein the layer of the cathode active material has a film thickness in a range from 25 to 110 μm . If a layer of a cathode active material is provided on each surface of a cathode current collector, the sum of the film thicknesses of the layers of the cathode active material ranges between 50 and 220 μm . The non-aq. electrolyte may be a liq.-based electrolyte or a polymer electrolyte.

IT **407606-49-9**, Iron lithium magnesium phosphate ($\text{Fe}_{0.2}\text{Li}_{0.05}\text{Mg}_{0.8}(\text{PO}_4)$) (nonaq. electrolyte secondary battery with compd. of **olivinic** structure as cathode active material)

RN 407606-49-9 HCAPLUS

CN Iron lithium magnesium phosphate ($\text{Fe}_{0.2}\text{Li}_{0.05}\text{Mg}_{0.8}(\text{PO}_4)$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
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=====+=====+=====
O4P      |      1      |      14265-44-2
Mg       |      0 - 0.8  |      7439-95-4
Li       |      0.05 - 1.2 |      7439-93-2
Fe       |      0.2 - 1   |      7439-89-6
=====+=====+=====

IC  ICM  H01M010-40
    ICS  H01M004-58
CC  52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST  battery secondary olivinic structure cathode active
    material
IT  Ball milling
    Battery cathodes
    Secondary batteries
        (nonaq. electrolyte secondary battery with compd. of
        olivinic structure as cathode active material)
IT  Carbon black, uses
        (nonaq. electrolyte secondary battery with compd. of
        olivinic structure as cathode active material)
IT  10377-52-3, Lithium phosphate  13977-75-8, Phosphoric acid,
    iron(3+) salt (3:2)
        (nonaq. electrolyte secondary battery with compd. of
        olivinic structure as cathode active material)
IT  108-32-7, Propylene carbonate  616-38-6, Dimethyl carbonate
    7440-44-0, Carbon, uses  7782-42-5, Graphite, uses  15365-14-7,
    Iron lithium phosphate felipo4  21324-40-3, Lithium
    hexafluorophosphate  407606-22-8, Chromium iron lithium phosphate
    (Cr0-0.8Fe0.2-1Li0.05-1.2(PO4))  407606-24-0, Cobalt iron lithium
    phosphate (Co0-0.8Fe0.2-1Li0.05-1.2(PO4))  407606-26-2, Copper iron
    lithium phosphate (Cu0-0.8Fe0.2-1Li0.05-1.2(PO4))  407606-28-4,
    Aluminum iron lithium phosphate (Al0-0.8Fe0.2-1Li0.05-1.2(PO4))
    407606-30-8, Gallium iron lithium phosphate (Ga0-0.8Fe0.2-1Li0.05-
    1.2(PO4))  407606-32-0, Boron iron lithium phosphate
    (B0-0.8Fe0.2-1Li0.05-1.2(PO4))  407606-36-4, Iron lithium nickel
    phosphate (Fe0.2-1Li0.05-1.2Ni0-0.8(PO4))  407606-39-7, Iron
    lithium vanadium phosphate (Fe0.2-1Li0.05-1.2V0-0.8(PO4))
    407606-42-2, Iron lithium molybdenum phosphate (Fe0.2-1Li0.05-1.2Mo0-
    0.8(PO4))  407606-44-4, Iron lithium titanium phosphate
    (Fe0.2-1Li0.05-1.2Ti0-0.8(PO4))  407606-47-7, Iron lithium zinc
    phosphate (Fe0.2-1Li0.05-1.2Zn0-0.8(PO4)) 407606-49-9,
    Iron lithium magnesium phosphate (Fe0.2-1Li0.05-1.2Mg0-0.8(PO4))
    407606-51-3, Iron lithium niobium phosphate (Fe0.2-1Li0.05-1.2Nb0-
    0.8(PO4))  407629-83-8  407629-87-2  407629-90-7  407629-95-2
    407630-01-7  407630-05-1  407630-10-8  407630-14-2  407630-19-7
    407630-25-5, Aluminum iron lithium phosphate (Al0.7Fe0.3Li(PO4))
    407630-29-9, Gallium iron lithium phosphate (Ga0.7Fe0.3Li(PO4))
    407630-35-7  407630-40-4, Boron iron lithium phosphate
    (B0.75Fe0.25Li(PO4))  407630-46-0
        (nonaq. electrolyte secondary battery with compd. of
        olivinic structure as cathode active material)
IT  9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer
        (nonaq. electrolyte secondary battery with compd. of

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IT **olivinic** structure as cathode active material)
 7439-93-2, Lithium, uses
 (nonaq. electrolyte secondary battery with compd. of
olivinic structure as cathode active material)

L30 ANSWER 9 OF 14 HCAPLUS COPYRIGHT 2003 ACS

2002:256757 Document No. 136:282003 Lithium-based cathode active materials for rechargeable lithium battery and preparation thereof. Barker, Jeremy; Saidi, M. Yazid; Swoyer, Jeffrey L. (UK). U.S. Pat. Appl. Publ. US 2002039687 A1 20020404, 39 pp., Cont.-in-part of U. S. Ser. No. 484,799. (English). CODEN: USXXCO. APPLICATION: US 2001-908480 20010718. PRIORITY: US 2000-484799 20000118; WO 2000-US35302 20001222.

AB The invention provides novel lithium-mixed metal materials which, upon electrochem. interaction, release lithium ions, and are capable of reversibly cycling lithium ions. The invention provides a rechargeable lithium battery which comprises an electrode formed from the novel lithium-mixed metal materials. Methods for making the novel lithium-mixed metal materials and methods for using such lithium-mixed metal materials in electrochem. cells are also provided. The lithium-mixed metal materials comprise lithium and at least one other metal besides lithium. Preferred materials are lithium-mixed metal phosphates which contain lithium and two other metals besides lithium.

IT **349632-76-4P**, Iron lithium magnesium phosphate
 ($\text{Fe}_{0.9}\text{LiMg}_{0.1}(\text{PO}_4)$) **349632-79-7P**, Calcium iron lithium
 phosphate ($\text{Ca}_{0.1}\text{Fe}_{0.9}\text{Li}(\text{PO}_4)$)
 (lithium-based cathode active materials for rechargeable lithium
 battery and prepn. thereof)

RN 349632-76-4 HCAPLUS

CN Iron lithium magnesium phosphate ($\text{Fe}_{0.9}\text{LiMg}_{0.1}(\text{PO}_4)$) (9CI) (CA
 INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Mg	0.1	7439-95-4
Li	1	7439-93-2
Fe	0.9	7439-89-6

RN 349632-79-7 HCAPLUS

CN Calcium iron lithium phosphate ($\text{Ca}_{0.1}\text{Fe}_{0.9}\text{Li}(\text{PO}_4)$) (9CI) (CA INDEX
 NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Ca	0.1	7440-70-2
Li	1	7439-93-2
Fe	0.9	7439-89-6

IC ICM H01M004-58
ICS C01B025-45
NCL 429231950
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
IT **Olivine**-group minerals
(lithium-based cathode active materials for rechargeable lithium battery and prepn. thereof)
IT 84159-18-2P, Lithium vanadium phosphate $\text{Li}_3\text{V}_2(\text{PO}_4)_3$
349632-76-4P, Iron lithium magnesium phosphate
($\text{Fe}_{0.9}\text{LiMg}_{0.1}(\text{PO}_4)$) **349632-79-7P**, Calcium iron lithium phosphate ($\text{Ca}_{0.1}\text{Fe}_{0.9}\text{Li}(\text{PO}_4)$) 349632-82-2P, Iron lithium zinc phosphate ($\text{Fe}_{0.9}\text{LiZn}_{0.1}(\text{PO}_4)$)
(lithium-based cathode active materials for rechargeable lithium battery and prepn. thereof)
L30 ANSWER 10 OF 14 HCAPLUS COPYRIGHT 2003 ACS
2001:796594 Document No. 135:333335 Cathode active mass and batteries thereof. Katayama, Sadahiro; Inamasu, Norio (Yuasa Corporation, Japan). Jpn. Kokai Tokkyo Koho JP 2001307726 A2 20011102, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-122550 20000424.
AB The cathode active mass is $\text{LiFe}_{1-x}\text{M}_x\text{PO}_4$, where M = Mg, Ca, Sr, Ba, Sc, Y, Zn, Al, Ga, In, Si, and/or rare earth element and $0 < x < 0.5$. Batteries using the active mass are secondary Li batteries.
IT **349632-79-7**, Calcium iron lithium phosphate ($\text{Ca}_{0.1}\text{Fe}_{0.9}\text{LiPO}_4$)
(comps. of substituted iron lithium phosphates for cathodes in secondary lithium batteries)
RN 349632-79-7 HCAPLUS
CN Calcium iron lithium phosphate ($\text{Ca}_{0.1}\text{Fe}_{0.9}\text{Li}(\text{PO}_4)$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Ca	0.1	7440-70-2
Li	1	7439-93-2
Fe	0.9	7439-89-6

IC ICM H01M004-58
ICS H01M004-02; H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
IT **349632-79-7**, Calcium iron lithium phosphate
($\text{Ca}_{0.1}\text{Fe}_{0.9}\text{LiPO}_4$) 369596-75-8, Iron lithium strontium phosphate
($\text{Fe}_{0.9}\text{LiSr}_{0.1}(\text{PO}_4)$) 369596-76-9
(comps. of substituted iron lithium phosphates for cathodes in secondary lithium batteries)

L30 ANSWER 11 OF 14 HCAPLUS COPYRIGHT 2003 ACS
2001:546025 Document No. 135:109741 Preparation of lithium-based electrochemically active materials for lithium batteries. Barker,

Jeremy; Saidi, M. Yazid (Valence Technology, Inc., USA). PCT Int. Appl. WO 2001054212 A1 20010726, 97 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2000-US35302 20001222. PRIORITY: US 2000-484799 20000118.

AB The invention provides novel lithium-mixed metal materials which, upon electrochem. interaction, release lithium ions, and are capable of reversibly cycling lithium ions. The invention provides a rechargeable lithium battery which comprises an electrode formed from the novel lithium-mixed metal materials. Methods for making the novel lithium-mixed metal materials and methods for using such lithium-mixed metal materials in electrochem. cells are also provided. The lithium-mixed metal materials comprise lithium and at least one other metal besides lithium. Preferred materials are lithium-mixed metal phosphates which contain lithium and two other metals besides lithium.

IT **349632-76-4P**, Iron lithium magnesium phosphate ($\text{Fe}_{0.9}\text{LiMg}_{0.1}(\text{PO}_4)$) **349632-79-7P**, Calcium iron lithium phosphate ($\text{Ca}_{0.1}\text{Fe}_{0.9}\text{Li}(\text{PO}_4)$) (prepn. of lithium-based electrochem. active materials for lithium batteries)

RN 349632-76-4 HCAPLUS

CN Iron lithium magnesium phosphate ($\text{Fe}_{0.9}\text{LiMg}_{0.1}(\text{PO}_4)$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Mg	0.1	7439-95-4
Li	1	7439-93-2
Fe	0.9	7439-89-6

RN 349632-79-7 HCAPLUS

CN Calcium iron lithium phosphate ($\text{Ca}_{0.1}\text{Fe}_{0.9}\text{Li}(\text{PO}_4)$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Ca	0.1	7440-70-2
Li	1	7439-93-2
Fe	0.9	7439-89-6

IC ICM H01M004-48

ICS H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 49

IT 331622-65-2P, Iron lithium zinc phosphate ($\text{Fe}_{0.8}\text{LiZn}_{0.2}(\text{PO}_4)$)
349632-76-4P, Iron lithium magnesium phosphate
($\text{Fe}_{0.9}\text{LiMg}_{0.1}(\text{PO}_4)$) **349632-79-7P**, Calcium iron lithium
phosphate ($\text{Ca}_{0.1}\text{Fe}_{0.9}\text{Li}(\text{PO}_4)$) 349632-82-2P, Iron lithium zinc
phosphate ($\text{Fe}_{0.9}\text{LiZn}_{0.1}(\text{PO}_4)$) 349632-85-5P 349632-88-8P
(prepn. of lithium-based electrochem. active materials for
lithium batteries)

L30 ANSWER 12 OF 14 HCAPLUS COPYRIGHT 2003 ACS

2001:545615 Document No. 135:109740 Preparation of lithium-containing
materials for battery cathodes. Barker, Jeremy; Saidi, M. Yazid;
Swoyer, Jeffrey L. (Valence Technology, Inc., USA). PCT Int. Appl.
WO 2001053198 A1 20010726, 94 pp. DESIGNATED STATES: W: AE, AG,
AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ,
DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN,
IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG,
MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL,
TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG,
KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE,
DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE,
SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO
2000-US35438 20001222. PRIORITY: US 2000-484919 20000118.

AB The invention provides novel lithium-mixed metal materials which,
upon electrochem. interaction, release lithium ions, and are capable
of reversibly cycling lithium ions. The invention provides a
rechargeable lithium battery which comprises an electrode formed
from the novel lithium-mixed metal materials. Methods for making
the novel lithium-mixed metal materials and methods for using such
lithium-mixed metal materials in electrochem. cells are also
provided. The lithium-mixed metal materials comprise lithium and at
least one other metal besides lithium. Preferred materials are
lithium-mixed metal phosphates which contain lithium and two other
metals besides lithium.

IT **349632-76-4P**, Iron lithium magnesium phosphate
($\text{Fe}_{0.9}\text{LiMg}_{0.1}(\text{PO}_4)$) **349632-79-7P**, Calcium iron lithium
phosphate ($\text{Ca}_{0.1}\text{Fe}_{0.9}\text{Li}(\text{PO}_4)$)
(prepn. of lithium-contg. materials for battery cathodes)

RN 349632-76-4 HCAPLUS

CN Iron lithium magnesium phosphate ($\text{Fe}_{0.9}\text{LiMg}_{0.1}(\text{PO}_4)$) (9CI) (CA
INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Mg	0.1	7439-95-4
Li	1	7439-93-2
Fe	0.9	7439-89-6

RN 349632-79-7 HCAPLUS
 CN Calcium iron lithium phosphate (Ca_{0.1}Fe_{0.9}Li(PO₄)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Ca	0.1	7440-70-2
Li	1	7439-93-2
Fe	0.9	7439-89-6

IC ICM C01B025-37
 ICS C01B025-45; H01M004-58
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 49
 IT 12162-92-4P, lithium vanadium oxide LiV_2O_5 204653-30-5P, Lithium vanadium phosphate $\text{Li}_3\text{V}_2(\text{PO}_4)_3$ **349632-76-4P**, Iron lithium magnesium phosphate (Fe_{0.9}LiMg_{0.1}(PO₄)) **349632-79-7P**, Calcium iron lithium phosphate (Ca_{0.1}Fe_{0.9}Li(PO₄)) 349632-82-2P, Iron lithium zinc phosphate (Fe_{0.9}LiZn_{0.1}(PO₄))
 (prepn. of lithium-contg. materials for battery cathodes)

* L30 ANSWER 13 OF 14 HCAPLUS COPYRIGHT 2003 ACS
 2001:225610 Document No. 134:254632 Secondary lithium batteries using lithium iron phosphate cathodes. Takahashi, Masaya; Tobishima, Shinichi; Takei, Koji; Sakurai, Yoji (Nippon Telegraph and Telephone Corp., Japan). Jpn. Kokai Tokkyo Koho JP 2001085010 A2 20010330, 8 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1999-261394 ~~19990916~~.

AB The batteries use $\text{Li}_z\text{Fe}_{1-y}\text{X}_y\text{PO}_4$ ($0 < z \leq 1$; X = element electrochem. stable in 3-4 V potential vs. Li std. potential) having **olivine**-type structure as the cathode active materials. Preferably, the X is Mg, Co, Ni, and/or Zn. The batteries, capable of charging and discharging at ≤ 4 V, inhibit decomn. of electrolyte, and show improved discharge capacity and cycling performance.

IT **331622-66-3P**, Iron lithium magnesium phosphate (Fe_{0.85}LiMg_{0.15}(PO₄))
 (cathodes; secondary Li batteries using lithium iron phosphate cathodes)

RN 331622-66-3 HCAPLUS
 CN Iron lithium magnesium phosphate (Fe_{0.85}LiMg_{0.15}(PO₄)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Mg	0.15	7439-95-4
Li	1	7439-93-2
Fe	0.85	7439-89-6

IC ICM H01M004-58
ICS H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT 331622-62-9P, Iron lithium nickel phosphate ($\text{Fe}_{0.8}\text{LiNi}_{0.2}(\text{PO}_4)$)
331622-63-0P, Cobalt iron lithium phosphate ($\text{Co}_{0.2}\text{Fe}_{0.8}\text{Li}(\text{PO}_4)$)
331622-64-1P, Cobalt iron lithium phosphate ($\text{Co}_{0.1}\text{Fe}_{0.9}\text{Li}(\text{PO}_4)$)
331622-65-2P, Iron lithium zinc phosphate ($\text{Fe}_{0.8}\text{LiZn}_{0.2}(\text{PO}_4)$)
331622-66-3P, Iron lithium magnesium phosphate
($\text{Fe}_{0.85}\text{LiMg}_{0.15}(\text{PO}_4)$)
(cathodes; secondary Li batteries using lithium iron phosphate cathodes)

L30 ANSWER 14 OF 14 HCAPLUS COPYRIGHT 2003 ACS
1991:683719 Document No. 115:283719 Crystal structure of simferite
 $\text{Li}(\text{Mg}, \text{Fe}^{3+}, \text{Mn}^{3+})_2[\text{PO}_4]_2$ [simferopolite]. Yakubovich, O. V.;
Bairakov, V. V.; Simonov, M. A. (Mosk. Gos. Univ., Moscow, USSR).
Doklady Akademii Nauk SSSR, 307(5), 1119-22 [Crystallogr.] (Russian)
1989. CODEN: DANKAS. ISSN: 0002-3264.

AB Dark-red grains of simferite (Sf) occur at the contact of rare-metal
pegmatite with phlogopitized pegmatite; the commonly twinned
crystals have their chem. compn. varying with optical properties (ns
.alpha. 1.690-1.704, .beta. 1.702-1.716, .gamma. 1.712-1.726). With
a possible space group of either $D_{162h} = \text{Pbnm}$ or $C_{92v} = \text{Pbn}21$, the
unit-cell parameters of Sf are: a 4.7468(7), b 10.101(2), and c
5.8992(7).ANG., Z = 4; the calcd. d. is 3.25 g/cm³. The Li⁺ cations
in the crystal structure of Sf are located in octahedrons with a
.hivin.1 symmetry. Measurements of cation-anion bond lengths in the
M octahedrons show that these are similar to octahedrons in the
structure of ferrosicklerite; coordinates of basis atoms, isotropic
and anisotropic temp. factors, and interat. distances (in the Li-
and M octahedrons and P tetrahedrons) are tabulated. Columns of
olivine-type bands in the crystal structure of Sf are formed
bound along the edges of Li-octahedrons; in contrast to minerals of
the isomorphous series triphylite-lithiophyllite, octahedrons in the
columns of **olivine** bands are statistically only
half-filled with Li atoms. The occupancy and geometry of the
polyhedrons in the Sf structure are related, both structurally and
chem., to members of the series triphylite-lithiophyllite and
ferrisicklerite-sicklerite. Based on the chem. analyses, the Li:P
ratio in Sf is 1:2; a structural formula of
 $\text{Li}_{0.5}(\text{Mg}_{0.5}\text{Mn}_{3+0.2}\text{Fe}_{3+0.3})[\text{PO}_4]$ is suggested for Sf.

IT **134914-37-7**, Simferite ($[(\text{Fe}_{0.5}-1\text{Mn}_{0-0.5})\text{Mg}]\text{Li}(\text{PO}_4)_2$)
(crystal structure of)

RN 134914-37-7 HCAPLUS

CN Simferite ($[(\text{Fe}_{0.5}-1\text{Mn}_{0-0.5})\text{Mg}]\text{Li}(\text{PO}_4)_2$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O4P	2	14265-44-2
Mn	0 - 0.5	7439-96-5

Mg	1	7439-95-4
Li	1	7439-93-2
Fe	0.5 - 1	7439-89-6

CC 53-1 (Mineralogical and Geological Chemistry)
 Section cross-reference(s): 75
 IT 134914-37-7, Simferite ($[(\text{Fe}_{0.5}-\text{Mn}_{0.5})\text{Mg}]\text{Li}(\text{PO}_4)_2$)
 (crystal structure of)

=> d l31 1-9 cbib abs hitstr hitind

L31 ANSWER 1 OF 9 HCAPLUS COPYRIGHT 2003 ACS
 2002:272912 Document No. 136:297398 **Cathode** and
anode materials for solid nonaqueous electrolyte
battery. Takahashi, Kimio; Hosoya, Mamoru; Miyake, Masami
 (Sony Corporation, Japan). Eur. Pat. Appl. EP 1195835 A2 20020410,
 22 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR,
 IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English).
 CODEN: EPXXDW. APPLICATION: EP 2001-123773 20011004. PRIORITY: JP
 2000-306877 20001005.

AB A **battery** is not deteriorated in cell characteristics and
 maintains the cell shape encapsulated in a laminate film even when
 overdischarged to a cell voltage of 0 V. The cell includes a
cathode contg. a compd. having the formula $\text{Li}_x\text{Fe}_{1-y}\text{M}_y\text{PO}_4$,
 where M is at least one selected from the group consisting of Mn,
 Cr, Co, Cu, Ni, V, Mo, Ti, Zn, Al, Ga, Mg, B and Nb, with 0.05
 .ltoreq. x .ltoreq. 1.2 and 0 .ltoreq. y .ltoreq. 0.8, an
anode and a solid electrolyte. A cell member comprised of
 the **cathode** and the **anode**, layered together with
 the interposition of a solid electrolyte, is encapsulated in a
 laminate film.

IT 407606-49-9, Iron lithium magnesium phosphate
 ($\text{Fe}_{0.2}-1\text{Li}_{0.05}-1.2\text{Mg}_{0.8}(\text{PO}_4)$)
 (**cathode** and **anode** materials for solid nonaq.
 electrolyte **battery**)

RN 407606-49-9 HCAPLUS

CN Iron lithium magnesium phosphate ($\text{Fe}_{0.2}-1\text{Li}_{0.05}-1.2\text{Mg}_{0.8}(\text{PO}_4)$)
 (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Mg	0 - 0.8	7439-95-4
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

IC ICM H01M010-40
 ICS H01M004-58

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 ST **battery** solid nonaq electrolyte **cathode**

- anode material**
- IT **Battery anodes**
- Battery cathodes**
- Battery electrolytes**
- (**cathode** and **anode** materials for solid nonaq. electrolyte **battery**)
- IT 7440-44-0, Carbon, uses 15365-14-7, Iron lithium phosphate felipo4
 407606-22-8, Chromium iron lithium phosphate ($\text{CrO}-0.8\text{FeO} \cdot 0.2-1\text{LiO} \cdot 0.05-1.2(\text{PO}_4)$) 407606-24-0, Cobalt iron lithium phosphate
 ($\text{CoO}-0.8\text{FeO} \cdot 0.2-1\text{LiO} \cdot 0.05-1.2(\text{PO}_4)$) 407606-26-2, Copper iron lithium
 phosphate ($\text{CuO}-0.8\text{FeO} \cdot 0.2-1\text{LiO} \cdot 0.05-1.2(\text{PO}_4)$) 407606-28-4, Aluminum
 iron lithium phosphate ($\text{AlO}-0.8\text{FeO} \cdot 0.2-1\text{LiO} \cdot 0.05-1.2(\text{PO}_4)$)
 407606-30-8, Gallium iron lithium phosphate ($\text{GaO}-0.8\text{FeO} \cdot 0.2-1\text{LiO} \cdot 0.05-1.2(\text{PO}_4)$) 407606-32-0, Boron iron lithium phosphate
 ($\text{BO}-0.8\text{FeO} \cdot 0.2-1\text{LiO} \cdot 0.05-1.2(\text{PO}_4)$) 407606-34-2, Iron lithium manganese
 phosphate ($\text{FeO} \cdot 0.2-1\text{LiO} \cdot 0.05-1.2\text{MnO} \cdot 0.8(\text{PO}_4)$) 407606-36-4, Iron
 lithium nickel phosphate ($\text{FeO} \cdot 0.2-1\text{LiO} \cdot 0.05-1.2\text{NiO} \cdot 0.8(\text{PO}_4)$)
 407606-39-7, Iron lithium vanadium phosphate ($\text{FeO} \cdot 0.2-1\text{LiO} \cdot 0.05-1.2\text{VO} \cdot 0.8(\text{PO}_4)$) 407606-42-2, Iron lithium molybdenum phosphate
 ($\text{FeO} \cdot 0.2-1\text{LiO} \cdot 0.05-1.2\text{MoO} \cdot 0.8(\text{PO}_4)$) 407606-44-4, Iron lithium titanium
 phosphate ($\text{FeO} \cdot 0.2-1\text{LiO} \cdot 0.05-1.2\text{TiO} \cdot 0.8(\text{PO}_4)$) 407606-47-7, Iron
 lithium zinc phosphate ($\text{FeO} \cdot 0.2-1\text{LiO} \cdot 0.05-1.2\text{ZnO} \cdot 0.8(\text{PO}_4)$)
407606-49-9, Iron lithium magnesium phosphate
 ($\text{FeO} \cdot 0.2-1\text{LiO} \cdot 0.05-1.2\text{MgO} \cdot 0.8(\text{PO}_4)$) 407606-51-3, Iron lithium niobium
 phosphate ($\text{FeO} \cdot 0.2-1\text{LiO} \cdot 0.05-1.2\text{NbO} \cdot 0.8(\text{PO}_4)$)
 (**cathode** and **anode** materials for solid nonaq. electrolyte **battery**)
- IT 7439-93-2, Lithium, uses
 (**cathode** and **anode** materials for solid nonaq. electrolyte **battery**)

- L31 ANSWER 2 OF 9 HCAPLUS COPYRIGHT 2003 ACS
 2002:272909 Document No. 136:297395 Method for fabrication of
cathode active material and a nonaqueous electrolyte
battery. Hosoya, Mamoru; Fukushima, Yuzuru; Sakai, Hidecki;
 Kuyama, Junji (Sony Corporation, Japan). Eur. Pat. Appl. EP 1195827
 A2 20020410, 31 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES,
 FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO.
 (English). CODEN: EPXXDW. APPLICATION: EP 2001-123894 20011005.
 PRIORITY: JP 2000-308300 20001006; JP 2000-308313 20001006.
- AB The invention comprises a method for producing a **cathode**
 active material having superior cell characteristics through
 single-phase synthesis of a composite material composed of a compd.
 represented by the general formula $\text{Li}_x\text{Fe}_1-y\text{MyPO}_4$ and a carbon
 material pos. and a method for producing a non-aq.
electrolyte cell employing the so produced
cathode active material. To this end, the **cathode**
 active material is prepd. by a step of mixing the starting materials
 for synthesis of the compd. represented by the general formula
 $\text{Li}_x\text{Fe}_1-y\text{MyPO}_4$, a step of milling a mixt. obtained by the mixing
 step, a step of compressing the mixt. obtained by the mixing step to
 a preset d. and a step of sintering the mixt. obtained by the

compressing step. A carbon material is added in any one of the above steps prior to the sintering step. The d. of the mixt. in the compressing step is set to not less than 1.71 g/cm³ and not larger than 2.45 g/cm³.

IT **407606-49-9**, Iron lithium magnesium phosphate
(Fe_{0.2}-1Li_{0.05}-1.2Mg_{0-0.8}(PO₄))
(method for fabrication of **cathode** active material and
nonaq. electrolyte **battery**)
RN 407606-49-9 HCAPLUS
CN Iron lithium magnesium phosphate (Fe_{0.2}-1Li_{0.05}-1.2Mg_{0-0.8}(PO₄))
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Mg	0 - 0.8	7439-95-4
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

IC ICM H01M004-58
ICS H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **cathode** active material nonaq electrolyte **battery**
IT Ball milling
Battery cathodes
Composites
Secondary **batteries**
(method for fabrication of **cathode** active material and
nonaq. electrolyte **battery**)
IT Carbon black, uses
(method for fabrication of **cathode** active material and
nonaq. electrolyte **battery**)
IT 7440-44-0, Carbon, uses 198782-39-7, Iron lithium phosphate
(FeLi₀₋₁(PO₄)) 407606-22-8, Chromium iron lithium phosphate
(Cr_{0-0.8}Fe_{0.2}-1Li_{0.05}-1.2(PO₄)) 407606-24-0, Cobalt iron lithium
phosphate (Co_{0-0.8}Fe_{0.2}-1Li_{0.05}-1.2(PO₄)) 407606-26-2, Copper iron
lithium phosphate (Cu_{0-0.8}Fe_{0.2}-1Li_{0.05}-1.2(PO₄)) 407606-28-4,
Aluminum iron lithium phosphate (Al_{0-0.8}Fe_{0.2}-1Li_{0.05}-1.2(PO₄))
407606-30-8, Gallium iron lithium phosphate (Ga_{0-0.8}Fe_{0.2}-1Li_{0.05}-
1.2(PO₄)) 407606-32-0, Boron iron lithium phosphate
(B_{0-0.8}Fe_{0.2}-1Li_{0.05}-1.2(PO₄)) 407606-34-2, Iron lithium manganese
phosphate (Fe_{0.2}-1Li_{0.05}-1.2Mn_{0-0.8}(PO₄)) 407606-36-4, Iron
lithium nickel phosphate (Fe_{0.2}-1Li_{0.05}-1.2Ni_{0-0.8}(PO₄))
407606-39-7, Iron lithium vanadium phosphate (Fe_{0.2}-1Li_{0.05}-1.2V_{0-0.8}(PO₄))
407606-42-2, Iron lithium molybdenum phosphate
(Fe_{0.2}-1Li_{0.05}-1.2Mo_{0-0.8}(PO₄)) 407606-44-4, Iron lithium titanium
phosphate (Fe_{0.2}-1Li_{0.05}-1.2Ti_{0-0.8}(PO₄)) 407606-47-7, Iron
lithium zinc phosphate (Fe_{0.2}-1Li_{0.05}-1.2Zn_{0-0.8}(PO₄))
407606-49-9, Iron lithium magnesium phosphate
(Fe_{0.2}-1Li_{0.05}-1.2Mg_{0-0.8}(PO₄)) 407606-51-3, Iron lithium niobium
phosphate (Fe_{0.2}-1Li_{0.05}-1.2Nb_{0-0.8}(PO₄)) 407629-87-2

407629-90-7 407629-95-2 407630-01-7 407630-10-8 407630-14-2
 (method for fabrication of **cathode** active material and
 nonaq. electrolyte **battery**)

IT 15365-14-7P, Iron lithium phosphate FeLiPO_4
 (method for fabrication of **cathode** active material and
 nonaq. electrolyte **battery**)

IT 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer
 (method for fabrication of **cathode** active material and
 nonaq. electrolyte **battery**)

L31 ANSWER 3 OF 9 HCAPLUS COPYRIGHT 2003 ACS
 2002:272908 Document No. 136:297394 Solid **electrolyte**
cell. Goto, Shuji; Hosoya, Mamoru; Endo, Takahiro (Sony
 Corporation, Japan). Eur. Pat. Appl. EP 1195826 A2 20020410, 16 pp.
 DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI,
 LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN:
 EPXXDW. APPLICATION: EP 2001-123774 20011004. PRIORITY: JP
 2000-306876 20001005.

AB A solid **electrolyte cell** in which cell
 characteristics are not deteriorated even on overdischarge to the
 cell voltage of 0 V, such that the shape of the cell encapsulated in
 the laminate film is maintained. The cell includes a
cathode contg. a compd. represented by the general formula
 $\text{Li}_x\text{Fe}_{1-y}\text{M}_y\text{PO}_4$ where $0.05 \leq x \leq 1.2$, $0 \leq y \leq 0.8$, and M is at least one selected from the group
 consisting of Mn, Cr, Co, Cu, Ni, V, Mo, Ti, Zn, Al, Ga, Mg, B and
 Nb, an **anode** and a solid electrolyte. An
electrode unit 1 comprised of the **cathode** and the
anode layered together with interposition of the solid
 electrolyte is encapsulated with a laminate film 2.

IT **407606-49-9**, Iron lithium magnesium phosphate
 $(\text{Fe}_{0.2}\text{-1Li}_{0.05}\text{-1.2Mg}_{0.8}(\text{PO}_4))$
 (solid **electrolyte cell**)

RN 407606-49-9 HCAPLUS
 CN Iron lithium magnesium phosphate $(\text{Fe}_{0.2}\text{-1Li}_{0.05}\text{-1.2Mg}_{0.8}(\text{PO}_4))$
 (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Mg	0 - 0.8	7439-95-4
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

IC ICM H01M004-58
 ICS H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **battery** solid electrolyte

IT Polyoxyalkylenes, uses
 (lithium complex; solid **electrolyte cell**)

IT **Battery cathodes**

Secondary batteries

(solid electrolyte cell)

IT Fluoropolymers, uses

(solid electrolyte cell)

IT 7439-93-2D, Lithium, polyethylene oxide complex 7791-03-9, Lithium perchlorate 12031-65-1, Lithium nickel oxide LiNiO_2 12057-17-9, Lithium manganese oxide LiMn_2O_4 15365-14-7, Iron lithium phosphate FeLiPO_4 25322-68-3D, Polyethylene oxide, lithium complex 116327-69-6, Cobalt lithium nickel oxide $\text{Co}_{0.1}\text{LiNi}_{0.9}\text{O}_2$ 147812-18-8, Iron lithium manganese oxide $\text{Fe}_{0.05}\text{LiMn}_{1.95}\text{O}_4$ 407606-22-8, Chromium iron lithium phosphate ($\text{Cr}_{0.05}\text{Fe}_{0.2}\text{Li}_{0.05}\text{PO}_4$) 407606-24-0, Cobalt iron lithium phosphate ($\text{Co}_{0.05}\text{Fe}_{0.2}\text{Li}_{0.05}\text{PO}_4$) 407606-26-2, Copper iron lithium phosphate ($\text{Cu}_{0.05}\text{Fe}_{0.2}\text{Li}_{0.05}\text{PO}_4$) 407606-28-4, Aluminum iron lithium phosphate ($\text{Al}_{0.05}\text{Fe}_{0.2}\text{Li}_{0.05}\text{PO}_4$) 407606-30-8, Gallium iron lithium phosphate ($\text{Ga}_{0.05}\text{Fe}_{0.2}\text{Li}_{0.05}\text{PO}_4$) 407606-32-0, Boron iron lithium phosphate ($\text{B}_{0.05}\text{Fe}_{0.2}\text{Li}_{0.05}\text{PO}_4$) 407606-34-2, Iron lithium manganese phosphate ($\text{Fe}_{0.2}\text{Li}_{0.05}\text{Mn}_{0.8}\text{PO}_4$) 407606-36-4, Iron lithium nickel phosphate ($\text{Fe}_{0.2}\text{Li}_{0.05}\text{Ni}_{0.8}\text{PO}_4$) 407606-39-7, Iron lithium vanadium phosphate ($\text{Fe}_{0.2}\text{Li}_{0.05}\text{V}_{0.8}\text{PO}_4$) 407606-42-2, Iron lithium molybdenum phosphate ($\text{Fe}_{0.2}\text{Li}_{0.05}\text{Mo}_{0.8}\text{PO}_4$) 407606-44-4, Iron lithium titanium phosphate ($\text{Fe}_{0.2}\text{Li}_{0.05}\text{Ti}_{0.8}\text{PO}_4$) 407606-47-7, Iron lithium zinc phosphate ($\text{Fe}_{0.2}\text{Li}_{0.05}\text{Zn}_{0.8}\text{PO}_4$) 407606-49-9, Iron lithium magnesium phosphate ($\text{Fe}_{0.2}\text{Li}_{0.05}\text{Mg}_{0.8}\text{PO}_4$) 407606-51-3, Iron lithium niobium phosphate ($\text{Fe}_{0.2}\text{Li}_{0.05}\text{Nb}_{0.8}\text{PO}_4$) 408331-94-2, Cobalt lithium nickel oxide ($(\text{Co},\text{Ni})\text{LiO}_2$) 408331-95-3, Cobalt lithium manganese oxide ($(\text{Co},\text{Mn})\text{LiO}_2$) 408331-96-4, Cobalt lithium zinc oxide ($(\text{Co},\text{Zn})\text{LiO}_2$) 408331-97-5, Cobalt lithium tin oxide ($(\text{Co},\text{Sn})\text{LiO}_2$) 408331-99-7, Cobalt lithium vanadium oxide ($(\text{Co},\text{V})\text{LiO}_2$) 408332-00-3, Cobalt lithium titanium oxide ($(\text{Co},\text{Ti})\text{LiO}_2$) 408332-01-4, Cobalt lithium molybdenum oxide ($(\text{Co},\text{Mo})\text{LiO}_2$) 408332-02-5, Cobalt lithium tungsten oxide ($(\text{Co},\text{W})\text{LiO}_2$) 408332-03-6, Cobalt lithium magnesium oxide ($(\text{Co},\text{Mg})\text{LiO}_2$) 408332-04-7, Cobalt lithium strontium oxide ($(\text{Co},\text{Sr})\text{LiO}_2$) 408332-05-8, Cobalt lithium niobium oxide ($(\text{Co},\text{Nb})\text{LiO}_2$) 408332-06-9, Cobalt iron lithium oxide ($(\text{Co},\text{Fe})\text{LiO}_2$) 408332-07-0, Cobalt copper lithium oxide ($(\text{Co},\text{Cu})\text{LiO}_2$) 408332-08-1, Aluminum cobalt lithium oxide ($(\text{Al},\text{Co})\text{LiO}_2$) 408332-09-2, Cobalt lithium borate oxide ($\text{Co}_{0.1}\text{Li}_{0.2}(\text{BO}_2)_{0.1}\text{O}_{10}$) 408332-10-5, Cobalt gallium lithium oxide ($(\text{Co},\text{Ga})\text{LiO}_2$) 408332-11-6, Chromium cobalt lithium oxide ($(\text{Cr},\text{Co})\text{LiO}_2$) 408332-12-7, Calcium cobalt lithium oxide ($(\text{Ca},\text{Co})\text{LiO}_2$) 408332-13-8, Iron lithium nickel oxide ($(\text{Fe},\text{Ni})\text{LiO}_2$) 408332-14-9, Copper lithium nickel oxide ($(\text{Cu},\text{Ni})\text{LiO}_2$) 408332-15-0, Aluminum lithium nickel oxide ($(\text{Al},\text{Ni})\text{LiO}_2$) 408332-16-1, Lithium nickel borate oxide ($\text{Li}_{0.2}\text{Ni}_{0.1}(\text{BO}_2)_{0.1}\text{O}_{10}$) 408332-17-2, Gallium lithium nickel oxide ($(\text{Ga},\text{Ni})\text{LiO}_2$) 408332-18-3, Chromium lithium nickel oxide ($(\text{Cr},\text{Ni})\text{LiO}_2$) 408332-19-4, Calcium lithium nickel oxide

((Ca,Ni)LiO-2O2) 408332-20-7, Lithium manganese nickel oxide
 (LiO-2(Mn,Ni)O2) 408332-21-8, Lithium nickel zinc oxide
 (LiO-2(Ni,Zn)O2) 408332-22-9, Lithium nickel tin oxide
 (LiO-2(Ni,Sn)O2) 408332-23-0, Lithium nickel vanadium oxide
 (LiO-2(Ni,V)O2) 408332-24-1, Lithium nickel titanium oxide
 (LiO-2(Ni,Ti)O2) 408332-25-2, Lithium nickel tungsten oxide
 (LiO-2(Ni,W)O2) 408332-26-3, Lithium molybdenum nickel oxide
 (LiO-2(Mo,Ni)O2) 408332-27-4, Lithium magnesium nickel oxide
 (LiO-2(Mg,Ni)O2) 408332-28-5, Lithium nickel strontium oxide
 (LiO-2(Ni,Sr)O2) 408332-29-6, Lithium nickel niobium oxide
 (LiO-2(Ni,Nb)O2) 408332-30-9, Lithium manganese nickel oxide
 (LiO-2(Mn,Ni)2O4) 408332-31-0, Lithium manganese zinc oxide
 (LiO-2(Mn,Zn)2O4) 408332-32-1, Lithium manganese tin oxide
 (LiO-2(Mn,Sn)2O4) 408332-33-2, Lithium manganese vanadium oxide
 (LiO-2(Mn,V)2O4) 408332-34-3, Lithium manganese titanium oxide
 (LiO-2(Mn,Ti)2O4) 408332-35-4, Lithium manganese molybdenum oxide
 (LiO-2(Mn,Mo)2O4) 408332-36-5, Lithium manganese tungsten oxide
 (LiO-2(Mn,W)2O4) 408332-37-6, Lithium magnesium manganese oxide
 (LiO-2(Mg,Mn)2O4) 408332-38-7, Lithium manganese strontium oxide
 (LiO-2(Mn,Sr)2O4) 408332-39-8, Lithium manganese niobium oxide
 (LiO-2(Mn,Nb)2O4) 408332-40-1, Iron lithium manganese oxide
 ((Fe,Mn)2LiO-2O4) 408332-42-3, Cobalt lithium manganese oxide
 ((Co,Mn)2LiO-2O4) 408332-44-5, Aluminum lithium manganese oxide
 ((Al,Mn)2LiO-2O4) 408332-45-6, Lithium manganese borate oxide
 (LiO-2MnO-2(BO2)O-2O4) 408332-46-7, Gallium lithium manganese
 oxide ((Ga,Mn)2LiO-2O4) 408332-47-8, Chromium lithium manganese
 oxide ((Cr,Mn)2LiO-2O4) 408332-48-9, Calcium lithium manganese
 oxide ((Ca,Mn)2LiO-2O4) 408332-58-1, Aluminum cobalt lithium
 nickel oxide (Al0.01Co0.98LiNi0.01O2) 412351-36-1, Iron lithium
 manganese phosphate (Fe0.9LiMn0.1(PO4))

(solid **electrolyte cell**)

IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate
 7782-42-5, Graphite, uses 12190-79-3, Cobalt lithium oxide colio2
 21324-40-3, Lithium hexafluorophosphate 24937-79-9, PvdF
 (solid **electrolyte cell**)

L31 ANSWER 4 OF 9 HCAPLUS COPYRIGHT 2003 ACS

2002:256645 Document No. 136:297382 Carbon-coated or
carbon-crosslinked redox materials with transition metal-lithium
oxide core for use as **battery electrodes**.

Armand, Michel; Gauthier, Michel; Magnan, Jean-Francois; Ravet,
 Nathalie (Hydro-Quebec, Can.). PCT Int. Appl. WO 2002027824 A1
 20020404, 78 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ,
 BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ,
 EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
 KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,
 MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM,
 TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD,
 RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES,
 FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD,
 TG, TR. (French). CODEN: PIXXD2. APPLICATION: WO 2001-CA1350
 20010921. PRIORITY: CA 2000-2320661 20000926.

AB Carbon-coated redox materials suitable for use in **battery electrodes** consist of a core surrounded by a coating, or interconnected by carbon crosslinks, in which the core includes a compn. of formula $\text{Li}_x\text{M}_1\text{-yM}'\text{y}(\text{XO}_4)_n$, in which $y = 0\text{-}0.6$, $x = 0\text{-}2$, $n = 0\text{-}1.5$; M is a transition metal; and M' is a element of fixed valence selected from Mg^{2+} , Ca^{2+} , Al^{3+} , and Zn^{2+} , and X is S, P, and Si. Synthesis of the materials is carried out by reacting a balanced mixt. of appropriate precursors in a reducing atm., to adjust the valence of the transition metals, in the presence of a carbon source, which is then pyrolyzed. The resulting products exhibit an excellent elec. cond. and a highly enhanced chem. activity.

IT **407640-53-3**, Iron lithium magnesium phosphate ($\text{Fe}_{0.7}\text{-1LiMg}_{0.3}(\text{PO}_4)$) **407640-54-4**, Calcium iron lithium phosphate ($\text{Ca}_{0.3}\text{Fe}_{0.7}\text{-1Li}(\text{PO}_4)$) **407640-55-5** (metal source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery electrodes**)

RN 407640-53-3 HCAPLUS

CN Iron lithium magnesium phosphate ($\text{Fe}_{0.7}\text{-1LiMg}_{0.3}(\text{PO}_4)$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Mg	0 - 0.3	7439-95-4
Li	1	7439-93-2
Fe	0.7 - 1	7439-89-6

RN 407640-54-4 HCAPLUS

CN Calcium iron lithium phosphate ($\text{Ca}_{0.3}\text{Fe}_{0.7}\text{-1Li}(\text{PO}_4)$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Ca	0 - 0.3	7440-70-2
Li	1	7439-93-2
Fe	0.7 - 1	7439-89-6

RN 407640-55-5 HCAPLUS

CN Iron lithium magnesium manganese phosphate ($\text{Fe}_{0.1}\text{LiMg}_{0.2}\text{Mn}_{0.1}(\text{PO}_4)$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Mn	0 - 1	7439-96-5
Mg	0 - 0.2	7439-95-4
Li	1	7439-93-2

Fe		0 - 1		7439-89-6
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IC ICM H01M004-48
 ICS C01B025-37; C01B033-20; H01M004-58; H01M004-62; C01B017-96
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 ST carbon encapsulated redox material **battery**
electrode; cathode battery carbon coated
 redox material
 IT Silanes
 (alkoxy, silicon source; carbon-coated or carbon-crosslinked
 redox materials with transition metal-lithium oxide core for use
 as **battery electrodes**)
 IT Polyoxyalkylenes, uses
 (alkyl ethers, oligomeric, aprotic solvent; carbon-coated or
 carbon-crosslinked redox materials with transition metal-lithium
 oxide core for use as **battery electrodes**)
 IT Fluoropolymers, uses
 Polyesters, uses
 Polyethers, uses
 (binders; carbon-coated or carbon-crosslinked redox materials
 with transition metal-lithium oxide core for use as
battery electrodes)
 IT **Battery cathodes**
Battery electrodes
 Redox agents
 (carbon-coated or carbon-crosslinked redox materials with
 transition metal-lithium oxide core for use as **battery**
electrodes)
 IT Transition metals, uses
 (**electrodes** contg.; carbon-coated or carbon-crosslinked
 redox materials with transition metal-lithium oxide core for use
 as **battery electrodes**)
 IT 78-93-3, Methyl ethyl ketone, uses 96-48-0, Butyrolactone
 96-49-1, Ethylene carbonate 107-21-1D, Ethylene glycol, alkyl
 ethers 108-32-7, Propylene carbonate 111-46-6D, Diethylene
 glycol, alkyl ethers 112-27-6D, Triethylene glycol, alkyl ethers
 112-60-7D, Tetraethylene glycol, alkyl ethers 463-79-6D, Carbonic
 acid, C1-4-alkyl esters
 (aprotic solvent; carbon-coated or carbon-crosslinked redox
 materials with transition metal-lithium oxide core for use as
battery electrodes)
 IT 9011-14-7, Poly(methyl methacrylate) 24937-79-9, Poly(vinylidene
 difluoride) 25014-41-9, Polyacrylonitrile
 (binders; carbon-coated or carbon-crosslinked redox materials
 with transition metal-lithium oxide core for use as
battery electrodes)
 IT 50-99-7, Glucose, reactions 57-48-7, Fructose, reactions
 57-50-1, Sucrose, reactions 58-86-6, Xylose, reactions 87-79-6,
 Sorbose 9002-88-4, Polyethylene 9003-07-0, Polypropylene
 9004-34-6, Cellulose, reactions 9004-34-6D, Cellulose, esters
 9004-35-7, Cellulose acetate 9005-25-8, Starch, reactions
 25212-86-6, Poly(furfuryl alcohol) 43094-71-9, Ethylene-ethylene

- oxide copolymer
(carbon source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery electrodes**)
- IT 407640-63-5, Iron lithium titanium phosphate sulfate ($\text{Fe}_{0.85}\text{Li}_{1.35}\text{Ti}_{0.15}(\text{PO}_4)_0.5(\text{SO}_4)$)
(**electrodes** contg.; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery electrodes**)
- IT 7439-89-6D, Iron, mixed oxides 7439-96-5D, Manganese, mixed oxides 7440-02-0D, Nickel, mixed oxides 7440-32-6D, Titanium, mixed oxides 7440-47-3D, Chromium, mixed oxides 7440-48-4D, Cobalt, mixed oxides 7440-50-8D, Copper, mixed oxides 7440-62-2D, Vanadium, mixed oxides 13816-45-0, Triphylite 15365-14-7, Iron lithium phosphate (FeLiPO_4) 213467-46-0, Iron lithium manganese phosphate ($\text{FeLi}_2\text{Mn}(\text{PO}_4)_2$)
(**electrodes** contg.; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery electrodes**)
- IT 90076-65-6
(electrolyte contg.; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery electrodes**)
- IT 516-03-0, Ferrous oxalate
(iron source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery electrodes**)
- IT 7429-90-5, Aluminum, uses 7440-31-5, Tin, uses 7440-36-0, Antimony, uses 7440-66-6, Zinc, uses 7782-42-5, Graphite, uses 39302-37-9, Lithium titanate 207803-50-7, Aluminum cobalt lithium magnesium nickel oxide 258511-24-9, Iron lithium nitride 263898-18-6, Cobalt manganese nitride 407640-62-4
(lithium-based **cathodes** contg.; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery electrodes**)
- IT 638-38-0, Manganese(II) acetate
(manganese source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery electrodes**)
- IT 546-89-4, Lithium acetate 553-91-3, Lithium oxalate 554-13-2, Lithium carbonate 1309-37-1, Ferric oxide, reactions 1310-65-2, Lithium hydroxide 1313-13-9, Manganese dioxide, reactions 1314-62-1, Vanadium pentoxide, reactions 1317-61-9, Magnetite, reactions 10045-86-0, Ferric phosphate 10102-24-6, Lithium silicate (Li_2SiO_3) 10377-48-7, Lithium sulfate 10377-52-3, Lithium phosphate (Li_3PO_4) 10421-48-4, Ferric nitrate 12057-24-8, Lithium oxide, reactions 12627-14-4 13453-80-0, Lithium dihydrogen phosphate 63985-45-5, Lithium orthosilicate 407640-52-2, Iron lithium manganese phosphate ($\text{Fe}_{0.1-1}\text{LiMn}_{0-0.9}(\text{PO}_4)$) **407640-53-3**, Iron lithium magnesium phosphate ($\text{Fe}_{0.7-1}\text{LiMg}_{0-0.3}(\text{PO}_4)$) **407640-54-4**, Calcium iron lithium phosphate ($\text{Ca}_{0-0.3}\text{Fe}_{0.7-1}\text{Li}(\text{PO}_4)$) **407640-55-5**

- 407640-56-6, Iron lithium phosphate silicate ($\text{FeLi}_{1-1.9}(\text{PO}_4)_0.1-1(\text{SiO}_4)_0-0.9$) 407640-57-7 407640-58-8, Iron lithium manganese phosphate sulfate ($\text{Fe}_{0-1}\text{Li}_{1-1.2}\text{Mn}_{0-0.2}[(\text{PO}_4), (\text{SO}_4)]$) 407640-59-9, Iron lithium manganese phosphate ($(\text{Fe}, \text{Mn})\text{Li}_{1-1.6}(\text{PO}_4)$) 407640-60-2, Iron lithium manganese phosphate sulfate ($\text{Fe}_{1-2}\text{Li}_{1-2}\text{Mn}_{0-1}[(\text{PO}_4), (\text{SO}_4)]$) 407640-61-3, Iron lithium titanium phosphate ($(\text{Fe}, \text{Ti})\text{Li}_{0.5-2}(\text{PO}_4)_1.5$)
 (metal source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery electrodes**)
- IT 25322-68-3D, Polyethylene glycol, alkyl ethers
 (oligomeric, aprotic solvent; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery electrodes**)
- IT 7664-38-2, Phosphoric acid, reactions 7664-38-2D, Phosphoric acid, esters 7783-28-0, Ammonium hydrogen phosphate 10124-54-6, Manganese phosphate
 (phosphorus source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery electrodes**)
- IT 7631-86-9, Silica, reactions
 (silicon source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery electrodes**)
- IT 7664-93-9, Sulfuric acid, reactions 7783-20-2, Ammonium sulfate, reactions
 (sulfur source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as **battery electrodes**)
- L31 ANSWER 5 OF 9 HCAPLUS COPYRIGHT 2003 ACS
 2002:9172 Document No. 136:225905 Clustering of Fe^{3+} in the $\text{Li}_{1-3x}\text{Fe}_x\text{MgPO}_4$ ($0 < x < 0.1$) solid solution. Goni, Aintzane; Lezama, Luis; Pujana, Ainhoa; Arriortua, Maria Isabel; Rojo, Teofilo (Universidad del Pais Vasco, Departamento Quimica Inorganica, Bilbao, 48080, Spain). International Journal of Inorganic Materials, 3(7), 937-942 (English) 2001. CODEN: IJIMCR. ISSN: 1466-6049. Publisher: Elsevier Science Ltd..
- AB The $\text{Li}_{1-3x}\text{Fe}_x\text{MgPO}_4$ ($0 < x < 0.1$) solid soln. was prepd. by solid state synthesis. The structure of these phases was detd. by x-ray diffraction on polycryst. samples, being isostructural with LiMgPO_4 . Fe^{3+} substitutes part of the Li^+ ions in the channels of the LiMgPO_4 structure along the [010] direction, creating cation vacancies. The IR bands corresponding to the vibrational modes of the phosphate groups undergo a gradual widening with the amt. of inserted iron as a consequence of the increase of disorder in the structure. The EPR spectra show signals with an effective $g' = 4.0$. This fact can be attributed to the presence of high spin Fe^{3+} ions in orthorhombic symmetry. The increase of Fe^{3+} in the compds. leads to a broadening of the Lorentzian EPR signals indicating the existence of magnetic interactions between the Fe^{3+} ions. Magnetic susceptibility measurements on the $\text{Li}_{1-3x}\text{Fe}_x\text{MgPO}_4$ ($0 < x < 0.1$) solid soln. show

antiferromagnetic behaviors which can be explained considering that the doped Fe³⁺ ions exhibit a short range magnetic order, forming clusters assocd. with the vacancies in the structure.

IT 210709-38-9P, Iron lithium magnesium phosphate
(Fe_{0.03}Li_{0.9}MgPO₄) 210709-40-3P, Iron lithium magnesium
phosphate (Fe_{0.1}Li_{0.7}MgPO₄) 402519-34-0P, Iron lithium
magnesium phosphate (Fe_{0-0.1}Li_{0.7-1}Mg(PO₄)) 402519-35-1P,
Iron lithium magnesium phosphate (Fe_{0.07}Li_{0.8}Mg(PO₄))
(prepn., crystal structure, ESR and magnetic properties)
RN 210709-38-9 HCAPLUS
CN Iron lithium magnesium phosphate (Fe_{0.03}Li_{0.9}Mg(PO₄)) (9CI) (CA
INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Mg	1	7439-95-4
Li	0.9	7439-93-2
Fe	0.03	7439-89-6

RN 210709-40-3 HCAPLUS
CN Iron lithium magnesium phosphate (Fe_{0.1}Li_{0.7}Mg(PO₄)) (9CI) (CA
INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Mg	1	7439-95-4
Li	0.7	7439-93-2
Fe	0.1	7439-89-6

RN 402519-34-0 HCAPLUS
CN Iron lithium magnesium phosphate (Fe_{0-0.1}Li_{0.7-1}Mg(PO₄)) (9CI) (CA
INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Mg	1	7439-95-4
Li	0.7 - 1	7439-93-2
Fe	0 - 0.1	7439-89-6

RN 402519-35-1 HCAPLUS
CN Iron lithium magnesium phosphate (Fe_{0.07}Li_{0.8}Mg(PO₄)) (9CI) (CA
INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====

O4P	1	14265-44-2
Mg	1	7439-95-4
Li	0.8	7439-93-2
Fe	0.07	7439-89-6

CC 78-7 (Inorganic Chemicals and Reactions)

Section cross-reference(s): 75, 77

IT **210709-38-9P**, Iron lithium magnesium phosphate (Fe_{0.03}Li_{0.9}MgPO₄) **210709-40-3P**, Iron lithium magnesium phosphate (Fe_{0.1}Li_{0.7}MgPO₄) **402519-34-0P**, Iron lithium magnesium phosphate (Fe_{0.01}Li_{0.7}-1Mg(PO₄)) **402519-35-1P**, Iron lithium magnesium phosphate (Fe_{0.07}Li_{0.8}Mg(PO₄)) (prepn., crystal structure, ESR and magnetic properties)

L31 ANSWER 6 OF 9 HCAPLUS COPYRIGHT 2003 ACS

2001:796402 Document No. 135:346863 **Cathode** active material for nonaqueous electrolyte **battery**. Li, Guohua; Yamada, Atsuo (Sony Corporation, Japan). Eur. Pat. Appl. EP 1150367 A2 20011031, 47 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 2001-109945 20010424. PRIORITY: JP 2000-128999 20000425; JP 2000-129000 20000425.

AB A pos. **electrode** active material and a nonaq. **electrolyte cell** which uses the pos. **electrode** active material are disclosed. The cell has a high discharge voltage without lowering the capacity and superior charging/discharging characteristics. To this end, the pos. **electrode** active material contains a compd. represented by the general formula $\text{Li}_x\text{MnyFe}_{1-y}\text{PO}_4$, wherein $0 < x \leq 2$ and $0.5 < y < 0.95$, or a compd. represented by the general formula $\text{Li}_x\text{MnyAl}_y\text{PO}_4$, where $0 < x \leq 2$ and $0 < y < 1$ and wherein A is a metal element selected from among Ti, Zn, Mg and Co or plural metal elements selected from among Ti, Fe, Zn, Mg and Co.

IT **371145-99-2P**
(**cathode** active material for nonaq. electrolyte **battery**)

RN 371145-99-2 HCAPLUS

CN Iron lithium magnesium manganese phosphate (Fe_{0.25}LiMg_{0.05}Mn_{0.7}(PO₄)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Mn	0.7	7439-96-5
Mg	0.05	7439-95-4
Li	1	7439-93-2
Fe	0.25	7439-89-6

IC ICM H01M004-50

ICS H01M004-58

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

- ST **cathode** active material nonaq electrolyte **battery**
 IT **Battery cathodes**
 (**cathode** active material for nonaq. electrolyte **battery**)
 IT Carbon black, uses
 (**cathode** active material for nonaq. electrolyte **battery**)
 IT Fluoropolymers, uses
 (**cathode** active material for nonaq. electrolyte **battery**)
 IT Secondary **batteries**
 (lithium; **cathode** active material for nonaq. electrolyte **battery**)
 IT 108-32-7, Propylene carbonate 616-38-6, Dimethylcarbonate
 7429-90-5, Aluminum, uses 21324-40-3, Lithium hexafluorophosphate
 371145-93-6, Iron lithium manganese phosphate ($\text{Fe}_{0.05}\text{-0.5Li}_{0.2}\text{Mn}_{0.5}\text{-0.95(PO}_4\text{)}$)
 (**cathode** active material for nonaq. electrolyte **battery**)
 IT 207462-44-0P 300858-61-1P 371145-94-7P 371145-95-8P
 371145-97-0P **371145-99-2P** 371146-01-9P 371146-06-4P
 371146-11-1P
 (**cathode** active material for nonaq. electrolyte **battery**)
 IT 24937-79-9, PvdF
 (**cathode** active material for nonaq. electrolyte **battery**)
- L31 ANSWER 7 OF 9 HCAPLUS COPYRIGHT 2003 ACS
 1998:596036 Document No. 129:205207 Secondary lithium **batteries** with lithium and magnesium containing oxide **cathodes**. Igawa, Akiko; Tsuruoka, Shigeo; Yoshikawa, Masanori; Muranaka, Kiyoshi; Komatsu, Yoshimi; Yamauchi, Shuko (Hitachi, Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 10241691 A2 19980911 Heisei, 25 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1997-354358 19971224. PRIORITY: JP 1996-343041 19961224.
- AB The **batteries** use **cathodes** composed layer structured LiMO_2 , where M = Mn, Co, Ni, and/or Fe, and part of Li is replaced by Mg. The **cathode** active mass is preferably $\text{Li}_w\text{Mg}_v\text{NixMlyNzO}_2$, where M1 = Mn, Co, and/or Fe, N = Si, Al, Ca, Cu, P, In, Sn, Mo, Nb, Y, Bi and/or B, $0 \leq w \leq 1.2$, $0 \leq v \leq 0.01$, $0 \leq x \leq 0.85$, $0 \leq y \leq 0.05$, and $0 \leq z \leq 0.2$; $\text{Li}_w\text{Mg}_v\text{CoxM}_2\text{z}'\text{O}_2$, where M2 = Ni, Mn, Fe, Si, Al, Ca, Cu, P, In, Sn, Mo, Nb, Y, Bi and/or B, and $0 \leq z' \leq 0.5$; $\text{Li}_w\text{Mg}_v\text{MnxM}_3\text{z}'\text{O}_2$, where M3 = Ni, Co, Fe, Si, Al, Ca, Cu, P, In, Sn, Mo, Nb, Y, Bi and/or B; or $\text{Li}_w\text{Mg}_v\text{FexM}_4\text{z}'\text{O}_2$, where M4 = Ni, Co, Mn, Si, Al, Ca, Cu, P, In, Sn, Mo, Nb, Y, Bi and/or B.
- IT 212076-01-2P 212076-03-4P 212076-49-8P
 212076-51-2P 212076-92-1P 212077-31-1P
 212077-32-2P 212077-33-3P 212077-34-4P
 212077-35-5P 212077-36-6P

(comps. and properties of magnesium contg. lithium transition metal oxide **cathodes** for secondary lithium **batteries**)

RN 212076-01-2 HCAPLUS

CN Iron lithium magnesium nickel oxide phosphate (Fe_{0.15}Li_{0-1.2}Mg_{0.01}Ni_{0.80}O_{1.8}(PO₄)_{0.05}) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	1.8	17778-80-2
O4P	0.05	14265-44-2
Ni	0.8	7440-02-0
Mg	0.01	7439-95-4
Li	0 - 1.2	7439-93-2
Fe	0.15	7439-89-6

RN 212076-03-4 HCAPLUS

CN Cobalt iron lithium magnesium nickel oxide phosphate (Co_{0.19}Fe_{0.1}Li_{0-1.2}Mg_{0.01}Ni_{0.70}O_{1.96}(PO₄)_{0.01}) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	1.96	17778-80-2
O4P	0.01	14265-44-2
Co	0.19	7440-48-4
Ni	0.7	7440-02-0
Mg	0.01	7439-95-4
Li	0 - 1.2	7439-93-2
Fe	0.1	7439-89-6

RN 212076-49-8 HCAPLUS

CN Cobalt iron lithium magnesium oxide phosphate (Co_{0.8}Fe_{0.19}Li_{0-1.2}Mg_{0.02}O_{1.96}(PO₄)_{0.01}) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	1.96	17778-80-2
O4P	0.01	14265-44-2
Co	0.8	7440-48-4
Mg	0.02	7439-95-4
Li	0 - 1.2	7439-93-2
Fe	0.19	7439-89-6

RN 212076-51-2 HCAPLUS

CN Cobalt iron lithium magnesium nickel oxide phosphate (Co_{0.75}Fe_{0.05}Li_{0-1.2}Mg_{0.01}Ni_{0.15}O_{1.8}(PO₄)_{0.05}) (9CI) (CA INDEX NAME)

Component	Ratio	Component
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		Registry Number
=====	=====	=====
O	1.8	17778-80-2
O4P	0.05	14265-44-2
Co	0.75	7440-48-4
Ni	0.15	7440-02-0
Mg	0.01	7439-95-4
Li	0 - 1.2	7439-93-2
Fe	0.05	7439-89-6

RN 212076-92-1 HCAPLUS

CN Cobalt iron lithium magnesium manganese oxide phosphate
 (Co0.15Fe0.05Li0-1.2Mg0.01Mn0.75O1.8(PO4)0.05) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	1.8	17778-80-2
O4P	0.05	14265-44-2
Co	0.15	7440-48-4
Mn	0.75	7439-96-5
Mg	0.01	7439-95-4
Li	0 - 1.2	7439-93-2
Fe	0.05	7439-89-6

RN 212077-31-1 HCAPLUS

CN Cobalt iron lithium magnesium oxide phosphate (Co0.19Fe0.8Li0-1.2Mg0.02O1.96(PO4)0.01) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	1.96	17778-80-2
O4P	0.01	14265-44-2
Co	0.19	7440-48-4
Mg	0.02	7439-95-4
Li	0 - 1.2	7439-93-2
Fe	0.8	7439-89-6

RN 212077-32-2 HCAPLUS

CN Iron lithium magnesium manganese oxide phosphate
 (Fe0.8Li0-1.2Mg0.02Mn0.1O1.6(PO4)0.1) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	1.6	17778-80-2
O4P	0.1	14265-44-2
Mn	0.1	7439-96-5
Mg	0.02	7439-95-4
Li	0 - 1.2	7439-93-2

Fe	0.8	7439-89-6
----	-----	-----------

RN 212077-33-3 HCAPLUS

CN Cobalt iron lithium magnesium nickel oxide phosphate
(Co_{0.05}Fe_{0.75}Li_{0-1.2}Mg_{0.01}Ni_{0.15}O_{1.8}(PO₄)_{0.05}) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.8	17778-80-2
O4P	0.05	14265-44-2
Co	0.05	7440-48-4
Ni	0.15	7440-02-0
Mg	0.01	7439-95-4
Li	0 - 1.2	7439-93-2
Fe	0.75	7439-89-6

RN 212077-34-4 HCAPLUS

CN Iron lithium magnesium nickel oxide phosphate (Fe_{0.8}Li_{0-1.2}Mg_{0.01}Ni_{0.19}O_{1.96}(PO₄)_{0.01}) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.96	17778-80-2
O4P	0.01	14265-44-2
Ni	0.19	7440-02-0
Mg	0.01	7439-95-4
Li	0 - 1.2	7439-93-2
Fe	0.8	7439-89-6

RN 212077-35-5 HCAPLUS

CN Iron lithium magnesium manganese borate oxide phosphate
(Fe_{0.8}Li_{0-1.2}Mg_{0.01}Mn_{0.18}(BO₃)_{0.01}O_{1.93}(PO₄)_{0.01}) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.93	17778-80-2
O4P	0.01	14265-44-2
BO3	0.01	14213-97-9
Mn	0.18	7439-96-5
Mg	0.01	7439-95-4
Li	0 - 1.2	7439-93-2
Fe	0.8	7439-89-6

RN 212077-36-6 HCAPLUS

CN Iron lithium magnesium manganese nickel borate oxide phosphate
(Fe_{0.8}Li_{0-1.2}Mg_{0.01}Mn_{0.08}Ni_{0.1}(BO₃)_{0.01}O_{1.93}(PO₄)_{0.01}) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	1.93	17778-80-2
O4P	0.01	14265-44-2
BO3	0.01	14213-97-9
Ni	0.1	7440-02-0
Mn	0.08	7439-96-5
Mg	0.01	7439-95-4
Li	0 - 1.2	7439-93-2
Fe	0.8	7439-89-6
IC	ICM H01M004-58	
	ICS H01M004-02; H01M010-40	
CC	52-2 (Electrochemical, Radiational, and Thermal Energy Technology)	
ST	secondary lithium battery cathode ; lithium	
	magnesium metal oxide battery cathode	
IT	Battery cathodes	
	(compns. and properties of magnesium contg. lithium transition	
	metal oxide cathodes for secondary lithium	
	batteries)	
IT	Secondary batteries	
	(lithium; compns. and properties of magnesium contg. lithium	
	transition metal oxide cathodes for secondary lithium	
	batteries)	
IT	212075-82-6P, Cobalt lithium magnesium nickel oxide	
	(Co _{0.1} LiMg _{0.01} Ni _{0.9} O ₂)	212075-83-7P 212075-84-8P 212075-85-9P
	212075-86-0P	212075-87-1P 212075-88-2P 212075-89-3P
	212075-90-6P	212075-91-7P 212075-92-8P 212075-93-9P
	212075-94-0P	212075-95-1P, Copper iron lithium nickel oxide
	(Cu _{0.2} Fe _{0.2} Li _{0-1.2} Ni _{0.6} O ₂)	212075-96-2P, Copper lithium manganese
	nickel oxide (Cu _{0.15} Li _{0-1.2} Mn _{0.25} Ni _{0.6} O ₂)	212075-97-3P
	212075-98-4P	212075-99-5P 212076-00-1P 212076-01-2P
	212076-02-3P 212076-03-4P	212076-04-5P 212076-05-6P
	212076-06-7P	212076-07-8P 212076-08-9P 212076-09-0P, Iron
	lithium magnesium nickel tin oxide (Fe _{0.2} Li _{0-1.2} Mg _{0.02} Ni _{0.7} Sn _{0.1} O ₂)	
	212076-10-3P	212076-11-4P 212076-12-5P 212076-13-6P
	212076-14-7P	212076-15-8P 212076-16-9P 212076-17-0P
	212076-18-1P	212076-19-2P 212076-20-5P 212076-21-6P
	212076-22-7P	212076-23-8P 212076-24-9P 212076-25-0P, Aluminum
	cobalt lithium nickel oxide (Al _{0.1} Co _{0.1} Li _{0-1.2} Ni _{0.8} O ₂)	
	212076-26-1P, Aluminum cobalt lithium nickel tin oxide	
	(Al _{0.1} Co _{0.1} Li _{0-1.2} Ni _{0.7} Sn _{0.1} O ₂)	212076-27-2P, Cobalt lithium
	manganese nickel oxide (Co _{0.1} Li _{0-1.2} Mn _{0.1} Ni _{0.8} O ₂)	212076-28-3P
	212076-29-4P	212076-30-7P 212076-31-8P 212076-32-9P
	212076-33-0P	212076-34-1P 212076-35-2P 212076-36-3P
	212076-37-4P	212076-38-5P 212076-39-6P 212076-40-9P
	212076-41-0P	212076-42-1P 212076-43-2P 212076-44-3P
	212076-45-4P	212076-46-5P 212076-47-6P 212076-48-7P
	212076-49-8P	212076-50-1P 212076-51-2P
	212076-52-3P	212076-53-4P 212076-54-5P 212076-55-6P

212076-56-7P 212076-57-8P, Cobalt iron lithium magnesium tin oxide
 (Co_{0.7}Fe_{0.2}Li_{0-1.2}Mg_{0.01}Sn_{0.102}) 212076-58-9P 212076-59-0P
 212076-60-3P 212076-61-4P 212076-62-5P 212076-63-6P
 212076-64-7P 212076-65-8P 212076-66-9P 212076-67-0P
 212076-68-1P 212076-69-2P 212076-70-5P 212076-71-6P
 212076-72-7P 212076-73-8P 212076-74-9P 212076-75-0P
 212076-76-1P 212076-77-2P 212076-78-3P 212076-79-4P
 212076-80-7P 212076-81-8P 212076-82-9P 212076-83-0P
 212076-84-1P, Copper iron lithium manganese oxide
 (Cu_{0.2}Fe_{0.2}Li_{0-1.2}Mn_{0.602}) 212076-85-2P 212076-86-3P
 212076-87-4P 212076-88-5P 212076-89-6P 212076-90-9P, Iron
 lithium manganese oxide phosphate (Fe_{0.19}Li_{0-1.2}Mn_{0.801.96}(PO₄)_{0.01})
 212076-91-0P **212076-92-1P** 212076-93-2P 212076-94-3P
 212076-95-4P 212076-96-5P 212076-97-6P 212076-98-7P
 212076-99-8P 212077-00-4P 212077-01-5P 212077-02-6P
 212077-03-7P 212077-04-8P 212077-05-9P 212077-06-0P
 212077-07-1P 212077-08-2P 212077-09-3P 212077-10-6P
 212077-11-7P 212077-12-8P 212077-13-9P 212077-14-0P
 212077-15-1P 212077-16-2P 212077-17-3P 212077-18-4P
 212077-19-5P 212077-20-8P 212077-21-9P 212077-22-0P
 212077-23-1P 212077-24-2P 212077-25-3P, Cobalt copper iron
 lithium oxide (Co_{0.2}Cu_{0.2}Fe_{0.6}Li_{0-1.202}) 212077-26-4P, Copper iron
 lithium manganese oxide (Cu_{0.2}Fe_{0.6}Li_{0-1.2}Mn_{0.202}) 212077-27-5P
 212077-28-6P 212077-29-7P 212077-30-0P **212077-31-1P**
212077-32-2P 212077-33-3P 212077-34-4P
212077-35-5P 212077-36-6P 212077-37-7P
 212077-38-8P 212077-39-9P, Cobalt iron lithium magnesium tin oxide
 (Co_{0.2}Fe_{0.7}Li_{0-1.2}Mg_{0.02}Sn_{0.102}) 212077-40-2P 212077-41-3P
 212077-42-4P, Iron lithium magnesium nickel tin oxide
 (Fe_{0.7}Li_{0-1.2}Mg_{0.01}Ni_{0.2}Sn_{0.102}) 212077-43-5P, Cobalt indium iron
 lithium oxide (Co_{0.2}In_{0.1}Fe_{0.7}Li_{0-1.202}) 212077-44-6P
 212077-45-7P 212077-46-8P 212077-47-9P 212077-48-0P
 212077-49-1P 212077-50-4P 212077-51-5P 212077-52-6P
 212077-53-7P

(compns. and properties of magnesium contg. lithium transition
 metal oxide **cathodes** for secondary lithium
batteries)

L31 ANSWER 8 OF 9 HCAPLUS COPYRIGHT 2003 ACS

1998:386203 Document No. 129:144051 7Li and 31P nuclear magnetic
 resonance studies of Li₁₋₃MgFexPO₄. Goni, A.; Bonagamba, T. J.;
 Silva, M. A.; Panepucci, H.; Rojo, T.; Barberis, G. E. (Facultad de
 Ciencias; Departamento de Quimica Inorganica, Universidad del Pais
 Vasco, Bilbao, Spain). Journal of Applied Physics, 84(1), 416-421
 (English) 1998. CODEN: JAPIAU. ISSN: 0021-8979. Publisher:
 American Institute of Physics.

AB The authors report a 7Li and 31P NMR study in the Li₁₋₃MgFexPO₄
 phases between 150 and 410 K This study, complementary to those made
 using Moessbauer and magnetic neutron diffraction expts., confirms
 that the Fe ions enter as Fe(III) in the lattice, and that they
 enter substituting Li ions. Ionic cond. measurements, together with
 the NMR behavior of the 7Li and 31P NMR spectra show that no Li

mobility occurs in the temp. range studied even with the addn. of the Fe impurity.

IT 210709-38-9, Iron lithium magnesium phosphate
(Fe_{0.03}Li_{0.9}Mg(PO₄)) 210709-39-0, Iron lithium magnesium
phosphate (Fe_{0.04}Li_{0.89}Mg(PO₄)) 210709-40-3, Iron lithium
magnesium phosphate (Fe_{0.1}Li_{0.7}Mg(PO₄))
(7Li and 31P NMR studies of Li₁₋₃xMgFexPO₄)
RN 210709-38-9 HCAPLUS
CN Iron lithium magnesium phosphate (Fe_{0.03}Li_{0.9}Mg(PO₄)) (9CI) (CA
INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Mg	1	7439-95-4
Li	0.9	7439-93-2
Fe	0.03	7439-89-6

RN 210709-39-0 HCAPLUS
CN Iron lithium magnesium phosphate (Fe_{0.04}Li_{0.89}Mg(PO₄)) (9CI) (CA
INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Mg	1	7439-95-4
Li	0.89	7439-93-2
Fe	0.04	7439-89-6

RN 210709-40-3 HCAPLUS
CN Iron lithium magnesium phosphate (Fe_{0.1}Li_{0.7}Mg(PO₄)) (9CI) (CA
INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Mg	1	7439-95-4
Li	0.7	7439-93-2
Fe	0.1	7439-89-6

CC 77-7 (Magnetic Phenomena)
Section cross-reference(s): 76
IT 7723-14-0, Phosphorus-31, properties 13775-51-4, Lithium magnesium
phosphate (LiMgPO₄) 13982-05-3, Lithium-7, properties
210709-38-9, Iron lithium magnesium phosphate
(Fe_{0.03}Li_{0.9}Mg(PO₄)) 210709-39-0, Iron lithium magnesium
phosphate (Fe_{0.04}Li_{0.89}Mg(PO₄)) 210709-40-3, Iron lithium
magnesium phosphate (Fe_{0.1}Li_{0.7}Mg(PO₄))
(7Li and 31P NMR studies of Li₁₋₃xMgFexPO₄)

L31 ANSWER 9 OF 9 HCAPLUS COPYRIGHT 2003 ACS

1991:85468 Document No. 114:85468 Triphylite-lithiophilite series in China. Ni, Yunxiang; Yang, Yueqing; Guo, Lihou; Zhou, Tianren; Ling, Yueying (Inst. Miner. Deposits, Chin. Acad. Geol. Sci., Peop. Rep. China). Yanshi Kuangwuxue Zazhi, 8(2), 144-55 (Chinese) 1989. CODEN: YKZAEN. ISSN: 1000-6524.

AB Representative samples covering a wide range in compn. over the ideal triphylite-lithiophilite series have been found in China. Chem. compns. of these triphylite-lithiophilite samples show that, in addn. to the major constituents Fe^{2+} and Mn^{2+} , the cations at the octahedral M(2) site are Mg^{2+} , Ca^{2+} , and Fe^{3+} . The highest MgO content is 7.38 wt.%. In general, Mg^{2+} readily replaces Fe^{2+} ; Ca^{2+} , sometimes, substitutes for Mn^{2+} at the M(2) site. Pure triphylite has not yet been found; the $\text{LiFe}[\text{PO}_4]$ content of all native triphylites is <80%. Nevertheless, there are very pure lithiophilites in nature. Relations of the chem. compn. (Fe/Mn ratio) to phys. properties, optical properties, and unit-cell dimensions of the series are examd. With increase in the Fe/Mn ratio, the sp. gr. and the n will values increase the cell parameters decrease, and the optic-axis angle varies regularly. Increase in the Mg^{2+} and Ca^{2+} contents of the minerals also causes variation in the above properties. The IR spectral anal. of 4 triphylite-lithiophilite samples collected in China was done to det. the correlation between chem. compn. and IR absorption peaks.

IT 132046-14-1

(compn. of, correlation of, with IR absorption peaks and optical properties and unit-cell parameters, of China)

RN 132046-14-1 HCAPLUS

CN Triphylite, magnesian (($\text{Fe}_{0.5-0.9}\text{Mg}_{0.1-0.5}\text{Li}(\text{PO}_4)$)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Mg	0.1 - 0.5	7439-95-4
Li	1	7439-93-2
Fe	0.5 - 0.9	7439-89-6

CC 53-1 (Mineralogical and Geological Chemistry)

IT 16455-24-6, Lithiophilite 17548-96-8, Ferroan lithiophilite

116768-44-6 132032-52-1 132032-53-2 132032-54-3

132046-14-1

(compn. of, correlation of, with IR absorption peaks and optical properties and unit-cell parameters, of China)